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Daniel Filipe Segurado Marcelo

Dissertação orientada pelo Prof. Doutor Leonel Garcia-Marques e coorientada pela Prof. Doutora Inês Duarte

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To my family,

friends,

and beloved one

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"To know what people really think, pay attention to what they do,
rather than what they say" – René Descartes

Resumo

A inferência espontânea de traços (IET) é um dos efeitos mais antigos e mais investigados pela Cognição Social, e o estudo de inferências no geral tem cerca de quarenta anos. Durante este tempo, as metodologias para estudar a IET foram manipuladas de várias formas, de forma a fornecer dados com o objetivo de entender completamente este efeito. No entanto, estas metodologias usam sequências linguísticas enquanto transporte de informação que irá elicitar a inferência, e estas mesmas sequências nunca foram controladas sob o ponto de vista da Linguística, o que pode causar vários efeitos inesperados.

A Linguística prevê que qualquer mudança na frase cause uma alteração na sua estrutura e no seu significado, mas a investigação de IET não tomou nada disto em consideração. Usando o enquadramento teórico da Linguística, eu estudei o comportamento da IET quando frases com o mesmo grau de complexidade linguística são modificadas ao inserir um advérbio de modo com terminação em *–mente*. Apesar de a investigação em IET focar-se muitas vezes numa metodologia com falsas memórias (por exemplo em Todorov & Uleman, 2002), a metodologia escolhida para este projeto envolve classificação por parte dos participantes de traços relacionados com as situações descritas em frases que tinham sido apresentadas anteriormente (Carlston, 2005).

O estudo foi feito com estudantes jovens adultos de diferentes áreas académicas e os resultados mostram que a inserção destes advérbios faz com que a IET mude em força e no traço que é mais inferido. Os advérbios de modo elicitaram novos traços que não estavam disponíveis anteriormente (ou que, pelo menos, não eram tão relevantes), mas os traços que as frases sem os advérbios de modo transmitiam não foram inibidos, e mantinham-se fortes. Fatores linguísticos da Semântica como a aceitabilidade das frases, a interpretação dos advérbios disponível aos participantes e os papéis temáticos nas frases parecem funcionar como elementos cruciais para as IETs, e o uso descuidado destes fatores pode significar que um novo traço seja inferido em vez de outro já esperado.

Palavras-chave: Inferência Espontânea de Traço, personalidade, advérbios de modo, Sintaxe, Semântica

Abstract

Spontaneous trait inference (STI) is one of the oldest and more researched effects in Social Cognition, and inferences in general have been studied for about forty years. During this time, methodologies used to study STI were manipulated in several ways, in order to provide data with the objective of fully understanding this effect.

However, these methodologies use linguistic cues as a vehicle to express information that will elicit the inference, and these cues were never controlled from a linguistic point of view, which may cause several unexpected effects. Linguistics predicts that any change to the sentence also causes a change in its structure and meaning, but STI research never took this into account.

Using Linguistics' theoretical framework, I studied STI behavior when sentences with the same degree of linguistic complexity are modified by inserting a manner adverb ending in –*mente*. Although in STI research authors have used methodologies measuring false memories (for instance, Todorov & Uleman, 2002), the methodology I have chosen for this project measures trait ratings after participants have studied situations described by sentences (Carlston & Skowronski, 2005).

This project was done with young adult students from different academic fields. The results show that inserting these adverbs change the strength for a trait inference, and changes which trait is preferably inferred by the participants. Inserting manner adverbs elicited new traits that were not available for the same sentences without the adverbs (or that at least were not as relevant). However, traits inferred from the sentences without the adverb were not inhibited and remained strong. Semantic linguistic factors like sentence acceptability, adverb interpretation and thematic roles for each constituent in the sentence seem to work as crucial elements for STI, and using them disregarding their importance can make a new trait other than the one we expect to appear.

Keywords: Spontaneous Trait Inference, personality, manner adverb, Syntax, Semantics

Resumo Alargado

Quando se fala em estudos sobre formação de impressões ou estudos sobre inferências de traços de personalidade, a literatura na área da Cognição Social é extensa e muito diversificada. Estes temas têm sido aprofundados por vários autores ao longo de cerca de 40 anos de investigação, e as suas metodologias têm vindo a sofrer várias manipulações.

Um dos primeiros a estudar assuntos relacionados com traços de personalidade e formação e impressões foi Asch (1946). Ele questionou-se sobre como nós organizávamos estes traços de forma a formar um perfil psicológico, e de que forma a nossa visão das pessoas mudava consoante diversas formas de apresentação e disposição dos traços de personalidade.

Anos mais tarde, Jim Uleman começou a estudar a personalidade por outra perspetiva. Na verdade, quando formamos impressões sobre alguém, muitas vezes, não temos esse objetivo, nem temos toda a informação explicitamente dada. Por exemplo, quando passamos pela rua e vemos alguém a trabalhar, podemos de imediato inferir que aquela pessoa é *Trabalhadora.* De uma forma automática, tomamos aquele comportamento e formulamos uma inferência, extraindo os traços de personalidade. Este efeito ficou conhecido na literatura como Inferência Espontânea de Traços (IET).

Também este efeito foi estudado de várias formas, mas sempre com metodologias que giravam à volta de sequências linguísticas. Estas sequências descreviam comportamentos passíveis de IET. Por exemplo, frases como *O João correu pela rua porque o autocarro estava atrasado* são passíveis de inferência do traço *Apressado.* Desde muito cedo que os vários autores que estudaram as IETs procuraram perceber mais sobre este efeito.

As IETs são um processo que se prendem a quem executa a ação descrita na frase, e são maioritariamente automáticas e não precisam de qualquer tipo de intenção. A IET requer poucos recursos cognitivos e é bastante rápida, não precisando de mais do que uns segundos de exposição à frase para acontecer. Vários autores consideram que esta atribuição de traço é tão forte que chega a ter um valor causal semelhante a *causa* → *efeito* (no caso da IET seria um par como *traço* → *comportamento*). Esta força permite que as IETs durem durante algumas semanas com ainda efeitos significativos. As IETs, no entanto, são sensíveis a vários fatores como a cultura e a linguagem, podendo alterar os traços inferidos de comportamentos.

No entanto, mesmo sabendo isto, os autores preocuparam-se em modificar as suas metodologias sempre tendo em conta uma perspetiva mais virada para fatores e conceitos da área da Psicologia e da Cognição Social, e utilizaram sequências linguísticas complexas com várias orações, modificadores e estruturas diferentes. Apesar de as IET e suas metodologias usarem processamento de texto e processamento linguístico, nenhum autor modificou ou controlou os elementos linguísticos apresentados aos participantes. Isto não ocorre apenas na literatura das IET, mas também na das inferências em geral. Mesmo assim, modelos como os encontrados em Graesser, Singer & Trabasso (1994) reconhecem que as inferências têm fatores linguísticos por base e com grande importância.

O quadro teórico da Linguística mostra que o processamento de frases não é uma simples soma de palavras ou sons. Há combinações complexas e estruturas que, quando alteradas, causam mudanças na compreensão e até mudanças no significado processado pelo leitor. Estas combinações estão sempre associadas a módulos da nossa Gramática e comunicam entre si, tornando o processo de leitura algo mais complexo do que se possa pensar. Para este projeto, foquei-me na Sintaxe e Semântica, analisando e controlando vários fatores.

Em primeiro lugar, para apresentar frases com a mesma complexidade linguística, comecei por controlar a estrutura sintáticas das mesmas. Fatores como o número de constituintes e as funções sintáticas foram tidas em conta, de forma a assegurar estruturas semelhantes entre as frases. Cada uma possuía um Sujeito, um verbo simples no Pretérito Perfeito do Indicativo e um argumento interno ou externo do verbo (Complemento se fosse argumento interno, Modificador se fosse argumento externo). A formação destes constituintes também foi controlada ao máximo, mantendo a sua estrutura e o seu peso. A posição destes constituintes também foi sempre a mesma (Sujeito – Verbo – Complemento).

Em segundo lugar, o tipo de advérbio e a posição que ocupa na frase também foram escolhidos com escrutínio. Uma classe de palavra que alterasse o verbo (a ação), mas que a alterasse com maleabilidade de forma a poder alcançar os diferentes traços de personalidade seria a classe indicada para este projeto. Além disto, para manter um controlo de tamanho de frase e de estrutura sintática, precisava de ser uma classe de palavras com criação morfológica regular. Todas estas caraterísticas descrevem os advérbios de modo acabados em *-mente*. Para controlar que tipo de interpretação os participantes iriam extrair do advérbio, posicionei-o após o verbo. Desta forma, uma interpretação na mudança do Modo como as ações eram executadas seria a interpretação preferida.

Existem duas grandes metodologias para estudar IET: metodologias de falsas memórias e metodologia de classificação. Este projeto usa o último. Numa metodologia de classificação, é dito aos participantes para memorizarem pares de fotografias e de frases que descrevem comportamentos. Depois de uma tarefa distratora, os participantes voltam a ver as mesmas fotografias, mas desta vez com traços de personalidade para classificarem, neste projeto, de 1 (*traço não descreve a pessoa*) a 7 (*traço descreve perfeitamente a pessoa*).

Neste projeto, os participantes leram as frases com os advérbios e classificaram quatro traços para cada fotografia, de forma a não se aperceberem do que estava a ser estudado antes de serem informados no fim da tarefa. Atribuí a cada frase sem advérbios um traço intuitivo e, depois, 79 participantes fizeram também uma atribuição ainda sem advérbios. Isto foi feito visto tratar-se de um corpus criado de raiz para que soubesse que traço era inferido em cada ação. Baseado na diferença / parecença entre a minha primeira atribuição e a atribuição dos participantes do pré-teste, criei quatro condições – Controlo, Oposto, Diferente e Vazio –, e escolhi um advérbio usando alguns critérios para cada condição.

Para a condição Controlo, não era adicionado nenhum advérbio. Para a condição Oposto, adicionei um advérbio cujo traço inferido fosse antónimo do da ação (por exemplo, *A Júlia ameaçou serenamente a Cecília* para a oposição entre os traços *Violento* e *Calmo*). Para a condição Diferente, adicionei um advérbio cujo traço inferido fosse diferente (mas coerente) do da ação (por exemplo, *O Bernardo roubou gananciosamente o Nicolau* para a diferença entre os traços *Falso* e *Egoísta*). Finalmente, para a condição Vazio, adicionei um advérbio cujo traço nunca tinha sido inferido por nenhum participante em nenhuma frase do pré-teste, e que por isso era um traço que não se relacionava com o tipo de comportamento (por exemplo, *O Samuel salvou dignamente o Gustavo* para o traço inferido no pré-teste *Generoso* e para o traço nunca inferido por ninguém no pré-teste *Honesto*).

A tarefa de inferência com advérbios nas frases foi feita por 61 participantes. Após esta tarefa, fiz uma análise mais focada em fatores linguísticos, comparando-os com resultados obtidos na tarefa. Além disto, fiz um pós-teste com 50 participantes para classificar a aceitabilidade semântica (se a frase fazia sentido ou não) de cada frase.

Os resultados foram conclusivos e mostram potencial para o futuro do estudo das IETs. De facto, os participantes mostraram que a introdução de apenas um advérbio de modo teve diferentes tipos de impacto nas várias condições. Na condição Oposto, o traço do advérbio de modo foi menos inferido do que o traço do pré-teste, mostrando que no caso de oposição semântica o verbo tem preferência. Na condição Diferente, o traço do advérbio de modo

conseguiu ser tão inferido como o traço do pré-teste, mostrando que o advérbio fez a diferença. Na condição Vazio, o traço do advérbio de modo foi mais inferido do que o traço do pré-teste, mostrando que o facto de o traço do advérbio ser completamente novo e inesperado faz com que os participantes o infiram mais facilmente e de forma mais forte.

Quando analisei certos fatores linguísticos, em combinação com os resultados obtidos na tarefa de inferência e no pós-teste, os fatores semânticos mostraram ter importância para a preferência entre os traços relacionados com o advérbio e os traços obtidos no pré-teste. A disponibilidade de uma interpretação do advérbio Orientada para o Sujeito faz com que os participantes prefiram o traço do advérbio mais vezes e de forma mais forte. Os participantes preferem mais vezes e de forma mais forte os traços relacionados com constituintes (neste caso analisei o verbo e o advérbio) que tornem as pessoas mais sociavelmente agradáveis (mais positivas como *adorar* ou *sensatamente*). Finalmente, o traço relacionado com o verbo é mais vezes preferido quando as frases têm uma aceitabilidade semântica muito alta, mas o advérbio causa interferência em muitos casos.

No geral, o aumento da complexidade linguística através do advérbio de modo causou mudanças nos traços das IETs e a análise de fatores linguísticos mostrou ser uma boa ferramenta para, no futuro, percebermos que fatores contribuem e inibem as IETs.

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1. Project Overview and Objective

Starting with the interest about how people in general form impressions from others, personality has been a point of interest not only to people in general, but mainly to Psychology researchers. In fact, this interest extends back to about 40 years ago, when Asch was starting to dwell in these matters, and researching about how we form impressions and how we integrate personality traits. Along the years, researchers tried to go deeper into personality study, as you can see in section 2.1, and started to use more complex linguistic cues in order to further analyze effects on forming impressions. Nowadays, personality trait inferences are broadly studied from many perspectives, testing and poking around how this mechanism works and what makes it stronger, faster or more accurate.

Language as a system has been somewhat overlooked by Psychology when used to study impression formation. A sentence has a syntactic, semantic and phonological weight and structure. When someone changes one of these sentence's structures, we deal with a different sentence. The literature on Linguistics as a cognitive science is also quite vast, with competing theoretical frames that diverge from one another, but which agree on the hypothesis that the principles and rules of language organization (grammar) are represented in the mind. Regarding Semantics, there is still plenty to think about when talking about semantic information; and Syntax, on the other hand, has been trying to get closer to how we cognitively arrange sentences and evaluate their structure. Nowadays, the work in Syntax, Semantics and Psycholinguistics has linguists researching about the effects on language structures during language processing.

When we have these two big frameworks into account, they can complement each other. On one side, Social Cognition and Psychology have the vast range of conclusions about personality processing, the inference process (regarding personality traits and world facts expressed in linguistic cues), and the methodology needed for the main task of this project. On the other side, Linguistics has a vast set of conclusions and findings about the structure of language and meaning, the crucial information about how sentences change and can be controlled, and has some methodologies that can become useful in order to further analyze the sentences I will be using in this project.

Having said this, what is the main focus of this project? In fact, over 40 years have passed since personality trait inferences have been researched. To study personality trait inferences, there is a common methodology. Firstly, the participants study a sentence-face pair, being

instructed to memorize both the face and the sentence – the sentence describing a behavior, and the face representing one person or entity involved in that same behavior. Afterwards, there is a distracter task. Finally, depending on what the researcher is studying, the third stage can either be a recognition stage – where the participants must answer *new* or *old* regarding a face-trait pair – or a rating stage – where participants must rate in a scale a trait that could describe a face previously seen. My project will use this latter option. Since we will use sentences as stimulus, I will focus on European Portuguese as the linguistic instrument for this project.

Along the years, there were many manipulations to these methodologies. For instance, one of the main manipulations done at first by Uleman (1999) had the objective to separate spontaneous inferences from intentional inferences. Like this one, many other manipulations to the method were made over time. However, although Winter & Uleman (1984) studies started with text comprehension, the linguistic part of the task was never further studied. In fact, the sentences usually used were syntactically complex, with verb modifiers, multiple verbs, or different sentence lengths.

Since the sentence is the vehicle of meaning that provides traits to be inferred, not surgically controlling the semantic and syntactic structure of each sentence might be allowing different traits to take priority, or even eliciting other traits different from those expected and desired. So, the objective for this project is to manipulate the corpus' linguistic complexity with a single word, and observe the effects on trait inferences. By the end I would like to understand if linguistic complexity in sentences and linguistic factors, contribute or constrain spontaneous trait inferences (STI). Adverbs are elements in a sentence that allow people to better describe situations. In this case, the manner of such situation is made explicit. In practical terms, every action, even when not explicitly mentioned, has a standard manner which we infer. However, with the introduction of manner adverbs, this manner is explicitly described, and therefore inferences might be slightly different.

Modifying a sentence is a simple task. Even just by adding a comma, or adding a small word, a sentence can have a completely new meaning. To maintain this modification as regular and controlled as possible, I chose to use adverbial insertion, specifically manner adverbs ending in *–mente*. All the justifications for choosing this type of adverbs can be found in section 2.4. But, in review, they are modal, morphologically regular, and they cause semantic meaning shifts.

In the following section, I will start presenting the theoretical backgrounds that will provide me all the information I need to build a controlled and acceptable research, as well as the main motivation for this project and a detailed description of the manipulation I will be using – manner adverbs. In section 3, I will be describing what type of control I used to create the list of stimuli for this project and what traits were inferred from the sentences without adverbs. In section 4, I will be describing the main task and the post-test that will provide the main analysis factors. Finally, in sections 5 and 6, I will be presenting the results I obtained as well as analyzing them according to different factors.

2. Theoretical Background

2.1. A Background on Personality Trait Inference

As stated previously, personality has been an early interest of Social Psychology. We can backtrack personality trait research as far as Asch (1946). Asch tried to research the nature and effects related to personality trait integration and processing by using a list of traits and attributing it to a single person. Afterwards, with modifications such as trait positioning in the list, trait polarity, and many more, Asch pinpoints some features about personality traits like the recency effect for recalling them, trait centrality among others.

Winter & Uleman (1984) is one of the first studies to combine personality trait studies with inferential studies in a more direct way. The concept of inference was not new to Social Psychology – the integration of information not explicitly stated in a sentence. Logical inferences and emotional inferences are another example of inferences, like it is the case when inferring the antecedent for a pronoun in a text and extracting the emotion from a situation.

Asch had stated, although without a proper methodology, that inferring about others' personalities is fast and spontaneous. This type of inferences was studied from many perspectives over the time, and the following sections serve as both a description of some of the features of personality trait inference and a review of some of the most important studies in this field.

Therefore, in section 2.1.1, I will be talking about the different empirical data regarding STI. In section 2.1.2, I will differentiate spontaneity and intentionality in personality trait inferences. In section 2.1.3, I will be distinguishing between trait inference and trait transference to better define inference. Finally, in section 2.1.4, I will be talking about recent studies that firmly join brain correlates to personality trait inference.

2.1.1. A broad empirical characterization of STI

In 1999, Uleman was trying to explain and research a particular feature that was highly debated about personality trait inferences: spontaneity. The concept of spontaneity might seem intuitive: when we infer about others' personality, we do not need an explicit goal or a

long time to do it. In fact, most examples in articles' introductions about this matter are quite clear to exemplify this feature. For instance, STI happens while you walk on the street, watching other people passing by you and how they behave. No one told you to form impressions about these people, but you naturally did it in an automatic way. However, as Uleman et al. (2012) state, STI can be described as largely automatic but not completely.

In Todorov & Uleman (2002), the authors tried to understand how STI related to other traits that we have in our mind, but that are not linked in any way to the actor of the inference. First of all, the authors used a different paradigm than the one I will be using in my project. Todorov and Uleman studied STI using a false recognition paradigm. This paradigm consists on the participants studying a face-sentence pair. Some of the sentences had the trait explicit, and in others, the trait was only inferable. In the test phase, the participant sees a face-trait pair and is asked if the sentence paired with the face they see contained the trait (*old*) or not (*new*).

What they found out is that participants falsely recognize the traits inferred as if they were explicit in the previously presented sentence. Another interesting finding was that the participants were twice as likely to falsely recognize implied traits when paired with the face of the actor of the action. This means that the inference was truly happening, and it was anchoring to the actor's face. This also happened when the unrelated traits were also the implied traits' antonyms, showing that not only the inference was occurring, but that it was also done in a coherent way – building a personality profile – and not letting incoherent traits (such as antonyms) occur for the same person.

Another manipulation done to test trait inferences was the goal given to the participants (memory condition vs. impression formation conditions), and the time the pair was presented to them. What the authors found out is that, the more time the pair was presented, the lower the false recognitions were. However, this only happened for the memory condition, since it was the one which would create STI, because they had no goal of forming impressions (inferring personality traits) but they still did it anyways. This result was also found in Todorov & Uleman (2003), where they found that a fast-pace presentation of 2 seconds was enough for a high false recognition of the implied traits.

However, there was still a plausible explanation for all these effects: participants were recalling the behavior of the actor and then making a plausible verification against the behavior. So, in fact, they might have been remembering the behavior described in the sentence instead of inferring from the actor directly. To test this, the authors mixed sentences

with explicit traits and implicit traits. The results found suggested that sentence recalling had no significant role on the recognition decisions. In a general way, this series of studies intended to show that STI were about the person, and not merely the behaviors, and that inference occurred in an encoding stage, rather than in retrieval. Todorov & Uleman (2003) also researched this matter by modifying the methodology but inserting a trait judgment in form of a question (for instance, *Is Richard a kind person?*) after the face-trait pair. The results showed that the participants who made person judgments were highly efficient in attributing the implied trait to the actor, showing once again that the trait was inferred from the actor, and not merely by the behavior.

However, instead of attributing traits to the actor, the data suggested that STI having the actor as the center of the inference could be interpreted with a simpler explanation: the participants were paying more attention to the actors' faces instead of control faces (the ones not related to the trait to be recognized). This would mean that the participant would have more information stored about the face he paid more attention to. Todorov & Uleman (2004) tested this by modifying the encoding stage of the paradigm: instead of a face-sentence pair, they would present two of them. The sentences would imply different traits about different people. The results were the same as before. Participants were more likely to falsely recognize the implied traits when they were prompted with the actor's face in the recognition stage.

Although these findings regarding the actor's representation being the center for STI are robust, they could be attached to a shallow representation of the actor, and not a conceptual representation of him. What this means is that these effects for STI would only stand if the actor's picture was the exactly same as the one they had seen previously. If this was the case, although we are talking about a strong and attributional effect, STI would connect to the exact physical appearance represented by a photo, and not to a mental representation of the person. Todorov & Uleman (2004) tested this by representing the actors with two different pictures, taken from different angles. The effect was still significant and therefore this suggested that the STI anchored not to a shallow representation of the person, but to a higher-level representation of the entity.

Todorov & Uleman (2003) studied an interesting question regarding the cognitive load needed for STI. To test this, they had the cognitive resources of the participants drained by executing a parallel task during the encoding stage, where the inference takes place. They

found that even with competition in cognitive resources usage, the STI was clear and strong for the actor's representation.

Another curious effect related to STI is their existence over time. Todorov & Uleman (2004) tested if STI lasted over time by separating the recognition stage one week from the encoding stage. This was meant to test the strong, attributional link that characterizes STI in the literature. They found data that showed that even though the time gap existed, the effect was still significantly present.

In a review done by Uleman, Saribay & Gonzalez (2008), the authors mention that STI, although it is a strong effect, can be affected by different criteria that are external to the face-sentence pair given for encoding. One big example of it are stereotypes. Wigboldus, Dijksterhuis & Van Knippenberg (2003) studied this by using behaviors and faces that would be processed in a stereotypical way, to test stereotype profiles and STIs. Their results suggested that participants had weaker STIs when they encoded stereotype-inconsistent information than when they were given stereotype-consistent or stereotype-neutral information. This is, in fact, quite coherent with what Uleman, Saribay & Gonzalez (2008) state about STI inhibiting inconsistent inferences and correcting them with new information. Uleman & Kressel (2013) also stated that STIs are generalized for a group if one member of said group is the actor of the behavior studied.

Other two criteria that can affect STI are culture and language. As for culture, it is easy to understand that some behaviors might elicit implied traits more strongly than others, and that will affect STIs, since they are dependent of world knowledge about behaviors and social etiquette in our midst. The effect of language, however, starts overlapping with Linguistics' field. Since traits are expressed using adjectives, languages that use adjectives regularly may be richer or stronger in STI. The way speakers describe others' may also influence STIs, whether we describe in a more abstract way or in a contextual way. Although these differences are referred by the authors, there are no direct applications of these variations for STI.

Finally, I would like to mention some interesting results about other characteristics found in STI. Uleman (2015) states that STI diminishes when participants are told that the face and trait were attributed randomly. This strengthens the assumption of the attributional property of STI anchoring only to an actor of a behavior with an implied trait. STI diminishes when the participants must answer if the face is lying or not, and are also predictive, which means

that these inferences guide participants to infer the next behavior of the inference target. This is due to the coherence characteristic of STI regarding personality profiles.

So, in general, STIs are elaborate, deep and strong effects that are largely automatic and are centered in the actor of the behavior with implied traits. They are stronger the less time the sentence and face are presented, and although they need memory and other cognitive resources, they are quite light and can be performed in parallel with other processes. Although STI is a strong effect, there are criteria that can affect it, including language use, culture and stereotypes.

Literature about STI has also been concerned about the nature of this link between the actor of the sentence and the implied trait. Kressel & Uleman (2015) briefly talk about some evidences regarding traits having a causal nature. Since it is not essential to my project, I will just refer some evidence of traits having a causal nature and being causal towards people and not behaviors.

The authors start by referring traits as having a causal nature, and that they can categorize either behavior or people. They talk about a divergence in what some authors thought about the traits' nature. Some, like Hamilton (1998), thought of traits as being causal attributions from the behavior. But others, such as Buss & Craik (1981) thought traits were a description of the action in the sentence.

However, a simple, yet controversial, methodology was used to verify what the relationship between traits and behaviors was. In the causal literature of STI, this methodology uses a pair of words that are causally related to one another and measures the reaction time until recognizing said pair. The assumption that comes from this method is that the faster the causal pair is processed, the more correct and easy to process it is. For instance, if I had presented a pair with a structure *cause* → *effect* (a predictive reading) and a pair with the structure *effect* → *cause* (a diagnostic reading), the first pair would be processed quicker than the other.

Kressel & Uleman (2015) describe this type of methodology. The objective was to test pairs like *trait* → *action* and see if they had a similar effect as in a *cause* → *effect* pair. This was found to be true by Kressel & Uleman (2010). The authors used different types of pairs and participants had to make a lexical decision (answer if the string of letters was a word or a non-word). The different types of pairs included cause-effect, associated words, trait-action, word–non-word, and unprimed actions with an unrelated word. Two lists were created: the

causal list and the associated list. Therefore, same types of pairs could be tested in different contexts. The results showed that trait-action pairs had faster answers in the causal context, when trait and action were treated with a causal relationship, than in the associated context. This suggests that traits are indeed causal regarding the actions.

The view of traits being causal is also corroborated when we think about how we can imply a trait in a behavior. Uleman (2015) states that inferring traits depends on world knowledge and this means that, to understand a sentence like John kicked Mike, we need to have the world knowledge of kicking, and in this world knowledge the implied trait should be linked to the action, in this case causally. So, in this case, John is violent because he kicked Mike. Causal schemata are usually used in Cognition to talk about world knowledge models, and this just adds up to other strong signs that traits and inference traits have indeed a causal nature.

2.1.2. STI vs. ITI

Although it is true that most personality trait inferences are spontaneous, it is also true that we can infer personality traits in an intentional way. A clear example of this is the interviewer's function in a job interview. It is the interviewer's main goal to correctly infer as many traits as possible, to attain a full personality profile of the candidate.

Uleman also tried to differentiate between these two types of inferences, which have different features. Two big ones that are widely discussed in the literature are control and awareness. Spontaneous inferences are uncontrolled and unaware, like while we walk in the street – we do not control the inference, and we are not aware of it until we have done it. The author also states that STI "are guided by chronically accessible constructs" (Uleman, 1999). This means that these constructs, these organization structures, are available to us no matter what goal we have in our mind. This is different from intentional trait inferences (ITI), which need specific constructs that exist for the sole purpose of the person's temporary intention (or goal) of inferring.

One big difference between STI and ITI is the catalyst for inference. Ferreira et al. (2012) state that the catalyst for STI is mere observation, as in the *walking down the street* example I gave in the beginning of the previous section. STIs emerge from the course of comprehending events and situations, and as new information overlaps new one. As for ITI,

the catalyst are intentions themselves. Since ITIs are goal-driven, only when the goal is active in our mind will ITIs start taking place. All the relevant information for that same goal will be considered to fulfill it.

Another difference between ITI and STI are the monitoring outcomes. Since it is mainly an automatic process, STIs do not entail monitoring processes. ITIs, however, since they have explicit goals for participants, must consciously monitor the outcome of the inference.

A third difference between these two types of inferences is that ITIs are used for the goals, but STIs have no particular goal to be used, although they may affect goal-driven behavior. However, STIs are less focused and have weaker effects, and ITIs are focused on the goal and, therefore, have stronger effects inhibiting goal-irrelevant impressions.

Although this is one of the big distinctions in the literature over personality trait inferences, I will be using STI for my current project, since it was the focus of most of the research, and is indeed the most interesting effect to study from Linguistics' point of view.

2.1.3. Inference vs. Transference

Another difference worth mentioning is between STI and spontaneous trait transference (STT). These two are distinct effects with several empirical data to show the gap between one and the other. Uleman & Kressel (2013) address STT as an association of a trait to a third entity (other than the target of the inference and the participant who is inferring). For instance, imagine that someone – let us call him John – told you that *Carl kissed Mary*. From what we know about STI, even without an explicit goal, you will start to infer traits about Carl (and possibly about Mary too). What you do not know is that a transference of these traits to John, the one who told you about Carl, happens too. This is what in the literature the authors call an STT.

Uleman (2015) characterizes STT as being weaker than STI, and the empirical data supports this idea. In general, different authors have talked about the two different natures between STI and STT. As I referred previously, STI has attributional characteristics reviewed in section 2.1.1. STT, however, is viewed as an association process, which means that it does not attribute the trait to the third entity, but associates it shallowly to it. Since STI and attributional processes are viewed as strong, deep and elaborate, STT can be viewed as weaker, more shallow and simple.

Uleman, Saribay & Gonzalez (2008) also describe some differences between STI and STT. As it is for attributional processes, STI has a bigger effect towards negative and extreme traits. This effect is not as significant to STT as it is for STI. Another big difference that truly suggests there is no attribution and just an association of the trait in STT is found when, during the false recognition paradigm, the participants are asked who performed the behavior described. By doing this, the link between the actor of the behavior and the implied traits gets stronger, and increases STI. However, with STT, not only does it not increase, they are also eliminated. Since it is an associative process, when the participants focus on the actor of the behavior, the association to the person who gave you the information does not take place. Also, STT is not affected by warning participants that this effect occurs. This suggests that the participants much like other uncontrolled effects such as false memories do not control this process.

Although I will not be using STT, this distinction is important for two reasons. First, discerning between attribution and association is an interesting dichotomy to take for linguistic analysis while talking about the processes that go over the linguistic comprehension. Secondly, for creating a good methodology – one that targets specifically STI and not other similar effects related to personality trait inference – it is important to get to know these distinctions.

2.1.4. Brain correlates for Inference

Although STI are a theme that Social Psychology keeps further analyzing, as Uleman & Kressel (2013) stated, impression formation research depends on several areas' development. In this project, Linguistics will be used as a tool to help better understand how traits can be modified by linguistic complexity increase. But there are other areas of cognition that are equally important for personality trait inference.

Briefly mentioning the causal schemata and the trait's mental organization and structuring again, areas such as Philosophy of Mind can help and provide important information that can be applied in future experiments to further test the causal nature of traits, or even theorize about a new language perspective, through Philosophy of Language.

One of the areas of Cognitive Science that already have some documented effects regarding inferences in general, and specifically STI, is Neuroscience. Such studies include

Ma et al. (2011) that used fMRI to see which areas were involved in STI and ITI. They found that different areas are used for STI and ITI, further differentiating both effects. STI uses areas like the temporo-parietal junction (TPJ) and the medial prefrontal cortex (mPFC) – that are areas related to temporary goals, intentions and others' beliefs. ITI recruits other areas like the precuneus, the superior temporal sulcus, temporal poles, among others. The fact that ITI recruits so many brain areas suggests that, because of the explicit goal in the participant's mind, they are led to think about the stimuli in more ways than one.

Ma et al. (2012) talk about other brain correlates that are rather important for STI literature. For starters, the posterior superior temporal sulcus (pSTS) is an area that also activates during trait attribution to behavioral description, as an encoding implication. The authors also try to link these brain correlates to the classic approach used to separate STI and ITI by using a dual-process system: one automatic process, that is fast and relies on world knowledge (STI would fit in here), and one controlled process, that is slow and cognitively demanding (ITI would fit in here). For both STI and ITI, the mPFC and the TPJ are activated, which are called the social mentalizing areas since they are deeply connected to thinking about others' beliefs.

The authors also refer that event-related potentials (ERP) studies have shown that trait inferences occur at 600 ms after the stimuli presentation. This data is very interesting to contrast with language processing studies using ERP, which will be presented in section 2.2.4, since syntactic and semantic reanalysis occur at about that time.

In the same article from 2012, Ma and colleagues try to find brain correlates for trait inferences by using incoherent information for inference in order to check which area was more activated. To do that, they created an fMRI study using sentences with implied traits. The conditions were defined by the last word of the sentence, and there were three conditions: coherent, incoherent and neutral. According to the condition they were in, participants were faced with different questions, and afterwards they had to recall and complete the sentences. The results for this study showed that mPFC was highly activated when incoherent information was given in the sentence.

Overall, the mPFC and the TPJ areas are very important for personality trait inferences, and such studies should continue to make this area of research richer and more complete. Mapping STI and ITI in the brain, knowing how traits are structured, how they are activated and how they are organized, and finally how STI behaves with linguistic differences in the stimuli are all interesting questions that complement STI research. When all these areas work

together, thanks to Cognitive Science, we will be able to truly understand what STI are and how they behave.

In the following sections, I will show a brief background on Linguistics (Syntax and Semantics) and the linguistic features to be analyzed in this project. As we shall see, it becomes problematic when we use linguistic structures without fully understanding what it means to use and process natural language, and what effects this might entail.

2.2. A Background in Linguistics

Another important framework to consider for this project is Linguistics'. Linguistics is one big contributor for Cognitive Science, and in the case of my project, it will serve as a basis of modification and control for the Psychology framework and methodology.

However, saying that Linguistics' role in this project will be limited to the insertion of manner adverbs in the sentences is taking sentence organization and processing for taken, as it has been done in the traits inference literature. The choice for the different syntactic functions, the thematic roles, the position for the arguments of the verb… everything has to be accounted for.

In this section, I will explain some crucial points I considered to produce a linguistic controlled corpus, as well as the variations that can be observed from participant to participant. In section 2.2.1, I will review some notions about European Portuguese Syntax, as well as the effects of constituent ordering in a sentence. In section 2.2.2, I will consider the semantic organization in a sentence, the relationship between the several semantic roles in a sentence and their function when used.

2.2.1. Syntax

Syntax is a subfield of Linguistics that studies constituent order. According to Raposo et al. (2013), Syntax's objective is to study the rules and principles that determine word combinations in a sentence, ordering them structurally and functionally when we apply them. In a simple sentence such as "O João comeu o bolo" (*John ate the cake*), the words combine with each other creating what we call phrases, which combine with each other until they can

make up a full-fledged sentence with meaning. This order is neither random nor unimportant. Changing even the slightest constituent might cause the sentence's meaning to shift or to be altered. For instance, in the previous example, if I choose to change the order to "O bolo comeu o João" (*The cake ate John*), the meaning expressed in the sentence is not the same, not only because we changed the order of the constituents, changing their syntactic functions, but also changing their semantic role in the sentence.

To understand how natural language Syntax works, it is necessary to describe how words combine to create phrases and sentences. Any phrase has a word which we call the head – the central element of the phrase. So, for instance, in a noun phrase like "o menino simpático" (*the nice boy*), the head would be the noun "menino" (*boy*). Besides the head, phrases can have other types of elements: specifiers, complements and adjuncts – or modifiers. There are at least two differences between the latter two types of elements. Structurally, the elements are distributed as such:

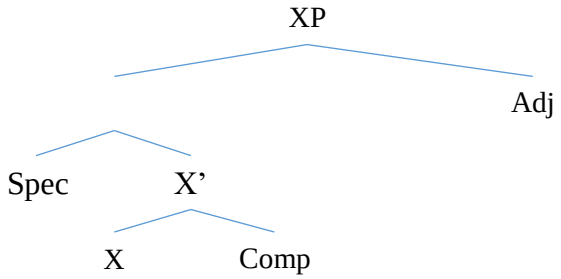

Figure 1 - Syntactic parse tree of XP, a phrase whose head is X.

Before analyzing the structure, notice that I use the X-bar Theory notation (Jackendoff, 1977; Stowell, 1981; Chomsky, 1986; a.o) as a way to best represent phrase structure. This will be notation used throughout the project.

Let us analyze the image. XP stands for a phrase whose head is X (this might be a noun – N –, a verb – V –, an adverb – Adv – etc.). Spec stands for specifier, which remains a bit more separated from the head X. Since it is on the same level of X' – an intermediate node of X –, and below XP, we say that it is a sister node of X' and a daughter node of XP. Some examples of specifiers are determiners. One of the daughters of X' is the head X and the other one is the complement, an element that is necessary to the phrase, and required by the lexical properties of the head. An adjunct, on the other hand, is optional and serves only to modify the smaller XP, and add information about it. A great example to see this structure in action is in a verbal phrase (VP). Check the following example:

(1) O João comprou a bola ontem. / *John bought the ball yesterday.*

The VP from sentence (1) "comprou uma bola ontem" (*bought the ball yesterday*) can be put in an X-bar notation parse tree like Figure 2.

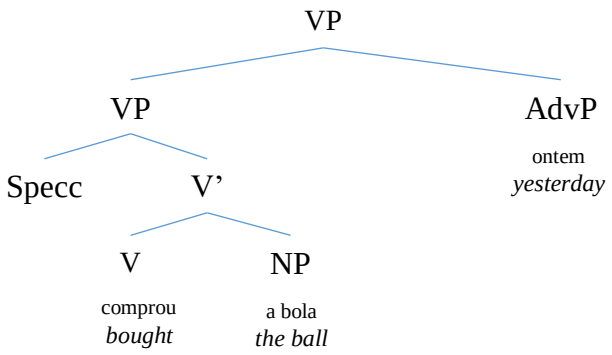

Figure 2 - Syntactic parse tree of the VP in sentence (1)

Although the Subject is not present in the previous image, it is generated (merged) in the VP specifier position, but it is afterwards moved to another node outside of the VP, as Figure 4 shows. The noun phrase (NP) "a bola" (*the ball*) is necessary for the VP to make sense. The lexical-semantic properties of the verb "comprar" (*to buy*) require such a complement, which I will come back to shortly; however, it does not require the presence of the adverbial phrase (AdvP), as you can see in (1a.) and (1b.), modifications to sentence (1). The symbol * before the sentences in the examples means that the sentence is ungrammatical, violating the rules of the language in question.

(1) a. *O João comprou ontem. / **John bought yesterday*.
b. O João comprou a bola. / *John bought the ball.*

There is a syntactic concept that I should introduce for the sake of linguistic analysis for manner adverbs: c-command. Reinhart (1976) introduced this concept, which is a structural relation needed to build and to parse trees, and usually it is used nowadays for the study of movement, binding, and scope. This concept is defined in terms of syntactic dominance: a node A dominates a node B if A is above B in the parse tree, and we can trace a path from A to B, without going higher than A in the parse tree. A node X c-commands a node Y if and only if:

- X does not dominate Y;

- Y does not dominate X;
- The first branching node that dominates X, also dominates Y.

Let us take as an example the following parse tree.

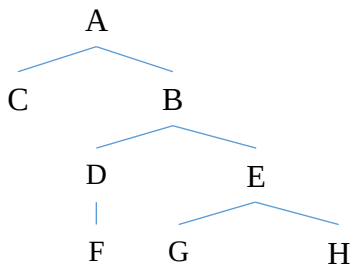

Figure 3 - A parse tree

In this tree, C c-commands B, D, E, F, G and H; B c-commands C; D c-commands E, G and H, and so on. However, for instance, A does not c-command C. This will be important for knowing what has scope over what, since scope can be explained via c-command.

What would the organization of a sentence such as "O Tiago pontapeou o Rúben" (*Tiago kicked Rúben*) be like? Although this might seem a simple sentence, there are phenomena that can be observed. The sentence is represented in a tree like we did before, in Figure 4.

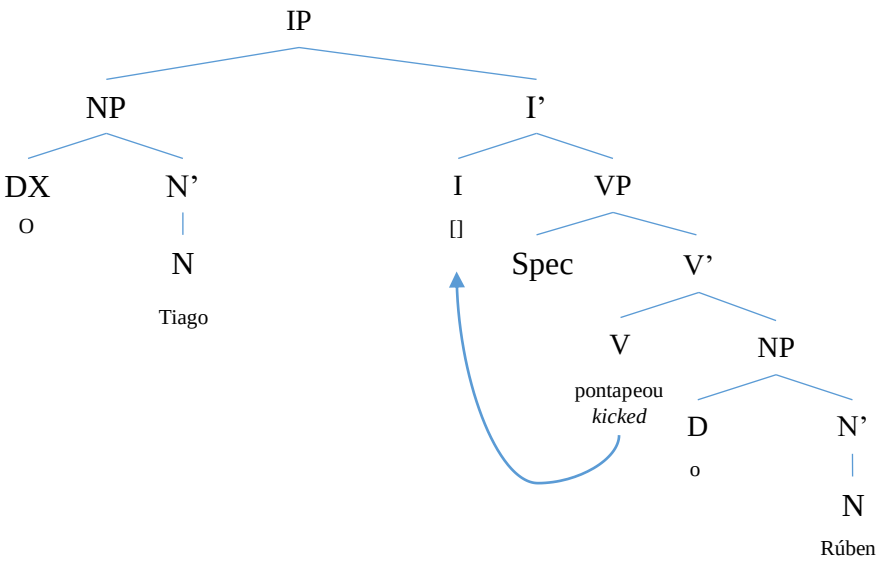

Figure 4 - Syntactic parse tree for the sentence "O Tiago pontapeou o Rúben" and verb movement

As you can see, the Inflection phrase (IP) node, which is what makes the main structure of the sentence, has its head node "empty". Although it has no word to fill it, it is not the case that node I is completely empty. In fact, Inflection information (that is, information about Mood and Tense, as well as Person and Number) is stored in that node. The verb, which needs to have access to this information, moves from its starting position inside the VP, and migrates to node I, where it will receive all the information needed to conjugate the verb in the right tense and mood. So, the final parsed tree of that sentence would have the verb in a slightly higher position in the tree.

Now that we know roughly how the sentence is organized, and what constituents are, I will address the next issue: which syntactic functions can constituents have in the sentence and how can we identify them. Due to the vast literature about the matter, I will keep to the functions of major constituents (namely Subject, Predicate, the different Objects, and Modifier, that is, immediate constituents of IP and VP). Although there are other syntactic roles, they are not going to be relevant to this project.

Firstly, the Subject of the sentence. In a broad sense, a Subject is the element which the Predicate is about. The verb in the Predicate agrees in number and person with the Subject. In contemporary linguistics, there is a difference between Subject of a predication and grammatical Subject. The first refers to the entity who we talk about in the predication; and the latter is the entity that agrees in number and person with the verb. This distinction is important, but it will not be relevant to dwell into, since the sentences to be used in the main task will have the canonical order for European Portuguese, which I will specify later. A Subject can be tested by asking the Predicate *who?*. For instance, in (2) we can test this.

(2) a. O menino comeu o bolo. / *The boy ate the cake.*
b. Quem comeu o bolo? O menino. / *Who ate the cake? The boy*.

Notice that the answer for this test is not just the head of a NP "menino" (*boy*), but the whole NP "o menino" (*the boy*). This is because syntactic functions like Subject are attributed to phrases and not just to heads.

Another syntactic function is the Predicate. The verb and its Objects compose the Predicate and it usually is what is said about the Subject. Therefore, as we have seen above, the Predicate should be assigned to the whole VP. This VP, however, is only composed by the verb and the complements the verb might require. The bigger VP, which contains the smaller VP and the VP modifiers, is not assigned the syntactic role of Predicate. A simple test

for the Predicate is a substitution test. We substitute the Predicate for an intransitive verb (with no Object requirement), such as *to sneeze*, and if the sentence is grammatical, then we have found the phrase which constitutes the Predicate.

As for verb Objects, there are three main types: Direct, Indirect and Oblique Objects. All of them have the same syntactic ordering status: they are positioned as complements for the verb, inside V'. However, there are some differences between them. The Direct Object is a phrase that has no preposition introducing it and can be substituted by accusative pronouns in European Portuguese or an object personal pronoun in English like in (3b.).

(3) a. O João chutou a bola. / *John kicked the ball.*
b. O João chutou-a. / *John kicked it.*

An Indirect Object is a phrase introduced by the preposition "a" (*to*) and it refers a target of the action. For instance, in (4a.), I present an example of an Indirect Object, and in (4b.) the substitution test for this type of object – which is the substitution for a dative pronoun in European Portuguese.

(4) a. O João telefonou à Maria. / *John phoned Mary.*
b. O João telefonou-lhe. / *John phoned her.*

The Oblique Object, or Prepositional Object, is introduced by a preposition and has other meanings besides the target of the action. In (5a.), I present an example of a Prepositional Object and in (5b.) the substitution test for this type of Object – where it is substituted by an adverb whose meaning does not differ too much.

(5) a. O João foi a Roma. / *John went to Rome.*
b. O João foi lá. / *John went there.*

Finally, there is one syntactic function left, and this one will be especially important for adverbs: Modifiers. Contrary to Objects, Modifiers are optional in the sentence. This means that, if they are taken away from the sentence, it still stays grammatical, like it is shown in sentence (1). Also, Modifiers always take the position of adjuncts. However, there can exist many types of Modifiers, and they are not exclusive to the VP. Sentences in (6) show the different types of Modifiers.

(6) a. O Paulo comprou o livro cuidadosamente. / *Paul bought the book carefully.*
b. O Paulo comprou o livro, cuidadosamente. / *Carefully, Paul bought the book.*

c. O quarto sujo ficou arrumado. / *The dirty room was cleaned.*

d. O Tiago, rapaz educado, conversou comigo. / *James, a kind boy, talked with me.*

Just to identify the underlined modifiers: in (6a.), we have a manner adverb as a VP Modifier; in (6b.), we have the same manner adverb, but as an IP Modifier; in (6c.), we have an adjective as a Restrictive Noun Modifier; and, in (6d.), we have a NP as an Appositive Noun Modifier. These examples were only introduced to show that the position of Modifier is available to any type of phrase, and not only VP. Regarding the difference between IP modifier and VP modifier, see section 2.4.2 where I describe these Modifiers and apply them to manner adverbs.

Before moving on to the next sectio, there are still two subjects I would like to address regarding Syntax. One is verb classes, and the other is the canonical order for constituents in European Portuguese.

Verbs can be classified by two main criteria. When combining both criteria, we find a new type of verb. The first one is the presence of a Subject, and the other one is the presence of an Object. Therefore, we can have four main verb classes:

- Subject presence: Personal (present) Vs. Impersonal (absent);
- Object presence: Transitive (present) Vs. Intransitive (absent).

However, depending on the type of Object the verb has, we find subtypes of transitive verbs. Take, for instance, the examples in (7):

(7) a. O João comeu a sopa. / *John ate the soup.*

b. O Carlos telefonou à Maria. / *Charles phoned Mary.*

c. O Manuel foi a Roma. / *Manuel went to Rome.*

In (7a.), since the verb requires a Direct Object, the verb is classified as a Direct Transitive verb; in (7b.), since the verb requires an Indirect Object, and, in (7c.), where the verb requires a Prepositional (or Oblique) Object, the verbs are classified as Indirect Transitive verbs. However, in English, if a verb requires a Prepositional Object, it is called a Prepositional verb.

Finally, sentences like (8) have verbs that have a complement but they are not quite transitive. These sentences have verbs that build a secondary predication attributed to the Subject. These verbs are called Copulative verbs.

(8) O Filipe está triste / *Philip is sad.*

Being aware of the different types of verbs is useful when analyzing the corpus to search and find patterns of rating behaviors.

Finally, the study of Syntax helps us on using constituent ordering in our favor to pass a specific meaning. Languages have a default word order that can be used for neutral and "normal" meaning. In European Portuguese, the canonical order for constituents is Subject – Verb – Object (SVO). Any other order of constituents causes an effect in meaning that can also be accompanied by phonological clues. To exemplify, consider (9).

(9) a. O João comeu o bolo. / *John ate the cake.*
b. Comeu o bolo, o João. / **Ate the cake, John.*
c. O bolo, O João comeu. / *The cake, John ate.*

Although in English it does not work as efficiently, these modifications in European Portuguese are plausible and put a focus on different phrases in the sentence. In (9a.), the information focus is the object, as it usually is in the canonical order of constituents. However, in (9b.), the order of constituents is VOS (Verb – Object – Subject) and this order puts not only the verb, but the whole VP in focus. In (9c.), the order of constituents is OSV (Object – Subject – Verb), an order which carries the interpretation that the object is put into contrast with some other entity with respect to the event of "comer" (*eating*).

This just shows that mastering and controlling syntactic information is not only useful for sentence processing, but it is necessary if researchers are using linguistic material as a source of information for an effect such as trait inference.

2.2.2. Semantics

In this section, I will be exploring some features of (lexical) meaning contained in words, and how constituent combination along the parse tree result in phrase and sentence meaning. I will be doing a top-bottom analysis, which means I will start by Semantics in the whole sentence and go from there to lexical Semantics.

Declarative sentences are assertions that hold worlds (often in the "real" world). This means that any declarative sentence is a frozen state of a world that might not share the same

properties of the world we live in. For instance, just because I utter sentence (10), it does not mean that it is false. Maybe I am just referring a situation in another world, different from ours, where animals talk.

(10) The horse told the cow it was tired.

Aside from that, sentences express aspect – mainly due to the features of the main verbs in the sentence, but also due to the types of complements that combine with the verb and to the adjuncts that modify the VP, changing the aspect of the situation described. There are two main classes of aspectual situations expressed by verbs: events and states. These two big classes are distinguished using features described in Aktionsart by Vendler (1957). Vendler divided verbs into four aspectual classes, but Comrie (1976) introduced a new class later on. Aktionsart describes the verb using its own temporal features, as well as how it is combined with its arguments (Objects and Subject). At the end of it all, we have a total of five classes described by four features. The four features I will further describe are dynamicity, duration, telicity and homogeneity.

Dynamicity refers to any situation where at least one participant changes because of the property expressed by the verb. For instance, *reading a book* is a dynamic situation, since we can segment phases to this action (reading one page after the other, reading chapter 1, 2, 3, and so on…) where more and more parts of the book change of state (from not being read to being read). If a sentence does not have this feature, the situation is called non-dynamic (in a situation like, for instance, *being sit down*).

Duration is another Aktionsart feature that refers properties that can be measured in time. For instance, if the situation lasts for an interval of time (as in *reading a book*) it is called a durative situation. However, if we cannot do this (as in *to explode* or *to close the store*), it is called a punctual situation. To find out whether a situation is durative or not, we can apply a test by adding an adjunct related to duration as in (11). The symbol # before the sentence in the examples below represents semantic anomaly. If the test is positive, when the sentence is semantically sound, then it is a durative situation.

(11) a. I read a book <u>for 1 hour</u>.
b. #I exploded <u>for 10 minutes</u>.
c. #I closed the store <u>for 2 hours</u>.

Another feature from Aktionsart is telicity. This feature refers to an end point, or a culmination of the action, with a result state. For instance, walking to school is a telic situation, since it has an end – which is *reaching school* – and a result state *the fact we are in school*. Another situation, such as *sneezing*, has no culmination, since it happens just in a moment without any type of culmination. We call these situations atelic. A good test for testing telicity, although not bulletproof, is using the construction shown in (12) and (13). Sentence (12) describes a telic situation and (13) an atelic situation.

(12) a. John wrote a book.
b. The book is written.
(13) a. John sneezed.
b. *John is sneezed.

Finally, the last feature from Aktionsart is homogeneity. A situation is homogeneous if all of its parts have the same properties of the whole situation. This is best understood with the example of *sleeping*. Let us consider that *John slept for 10 hours*. Before this situation, it is also true that *John slept for 10 minutes*. This means that, even if we segment the situation in smaller parts, John will always be in the same state: *sleeping*. *Sleeping*, in this case, is a homogeneous situation. However, if I changed the situation to *solving a puzzle*, like in *John solved a puzzle in 1 hour*, I would have a heterogeneous situation, since it is not true that *John solved a puzzle in 10 minutes* in that same situation. There are distinctive stages to solving a puzzle, different from one another.

Having the four Aktionsart features, we can now combine them to create five aspectual classes: State, Achievement, Accomplishment, Semelfactive and Activity. Of the four features, one (homogeneity) can be applied to many of the aspectual classes, but crossing the other three features as it is pictured in the following table, we can divide and characterize each aspectual class.

	Dynamic		**Non-dynamic**
	EVENT		STATE
	Punctual	**Durative**	
Telic	ACHIEVEMENT	ACCOMPLISHMENT	
Atelic	SEMELFACTIVE	ACTIVITY	

Table 1 - Aspectual Classes (Raposo et al., 2013)

As said previously, the first distinction is between dynamic and non-dynamic, and it separates States from Events. An example for a state is *being Portuguese*, for instance. There are some linguistic tests that can be used to check if a verb expresses a State. For instance, the use of Simple Present in states, has a meaning of real temporal present, and not a habituality meaning, as we can see in (14).

(14) a. O Rui é português (*habitualmente). / *Rui is portuguese (*usually).*
b. O Rui lê o livro (habitualmente). / *Rui reads the book (usually).*

In (14a.), we have a State, and the Simple Present test is positive, which means this tense, in that sentence, has a temporal interpretation: it denotes overlapping between the event time and the speech time, as shown by the ungrammatical natures of the sentence when added the manner adverb "habitualmente" (*usually*). On the contrary, in (14b.) the Simple Present has an aspectual interpretation: it carries the meaning that reading the book is a habitual event performed by the Subject of the sentence (that we are concerned with plural repeated events of the same kind taking place regularly before the speech event and possibly also after the speech event). States can also be divided into 3 subclasses: stable, episodic and divided by stages.

Combining both duration and telicity features from Aktionsart, we can characterize the other four aspectual classes. Achievements are non-durative but telic. An example of this aspectual class is *scoring a goal* or *entering a building*. Achievements can usually be combined with adverbial expressions denoting a punctual time (15a.), but not a durative time (15b.).

(15) a. A Rita marcou um golo aos 15 minutos de jogo. / *Rita scored a goal at 15' in the game.*
b. #A Rita marcou um golo durante 10 minutos. / #*Rita scored a goal for 10 minutes.*

Accomplishments are similar to Achievements, but they include a stage of preparation that leads to the Achievement. Examples of Accomplishments are *reading a book* or *going to school*. *Finishing reading the book* or *arriving at school* would be the Achievement in the Accomplishment. To test Accomplishments, we can do the opposite of what we did for Achievements (15). In this case, if it does not occur naturally with a punctual adjunct, but it is grammatical and sound with a durative adjunct, we can classify it as accomplishments.

The opposite of Achievements, Activities are durative and atelic. This aspectual class has no sense of a final state, as in Accomplishments, and therefore, there are no alterations in basic properties along time. Some examples of Activities are *swimming* or *running*. Activities cannot have adjuncts denoting an ending of the process described, and are introduced by the preposition "em" (*in*) as shown in (16a.), but can have adjuncts with a durative meaning (16b.).

(16) a. #A Maria correu em duas horas. / *#Maria ran in two hours.*
b. A Maria correu durante meia hora. / *Maria ran for half an hour.*

Finally, the last aspectual class, Semelfactives, was introduced by Comrie to cover a hole in the Aktionsart classification. This class is defined as non-durative and atelic, that is, they denote situations that only last for a moment. Some examples for Smelfactives are *sneezing* and *slapping* and there are two tests for them. The first one is adjunction by elements with a durative meaning (17a.) – which should only be interpreted in an iterative way if it truly is a Semelfactive. The second one is using a past participle (17b.), which would make the sentence unsound if it truly is a Semelfactive.

(17) a. O Carlos espirrou durante uma hora (várias vezes). / *Carlos sneezed for an hour (several times).*
b. *O Carlos está espirrado. / **Carlos is sneezed.*

Although the verb is crucial for aspect interpretation, there are other equally important elements. The presence of Modifiers and Objects, interacting with the verb can change the aspectual class present in a situation. In (18) we can see a change in aspectual class based solely on the presence / absence of a Direct Object.

(18) a. O João correu (durante duas horas). / *John ran (for two hours).* – ACTIVITY
b. O João correu os 100 metros (em dez segundos). / *John ran 100 meters (in ten seconds).* – ACCOMPLISHMENT

Although the tests speak for themselves, in an intuitive way, we can see the difference between the situations *running* and *running 100 meters*. The first has no end defined, and therefore is an atelic situation. But, with the Direct Object *100 meters*, the situation has an end point, and a result state, which is the state of *being past the 100 meters mark*, turning the

situation telic. Because of this feature change, the aspectual class goes from Activity (atelic and durative) to Accomplishment (telic and durative).

Another important semantic analysis is related to the role each constituent play in the situation described in the sentence, which is determined by the lexical properties of the verb: these are called thematic roles. And although it might seem that this type of roles can be related with syntactic functions, they have different information about each constituent, and therefore they should be analyzed separately.

Jackendoff (1972) is one author that dwells on these subjects of meaning structure inside constituents, and their role in the sentence. Thematic roles are assigned by the verb to the arguments, and some thematic roles are required and / or restricted for the sentence to become grammatical. I will mention some thematic roles, but the literature about this type of classification is vast, and considers this area quite malleable and subjective.

Since thematic roles are something that we can intuitively discuss, and not have strict tests to help us find out which role we are dealing with, tagging thematic roles can be easy but controversial and sometimes even confusing (see Dowty, 1991). However, this type of information matters just for me to control what will be happening upon the semantic and syntactic parsing during reading and to conduct further data analysis, so I will be mostly using the descriptions and roles described in Raposo et al. (2013) and Mateus et al. (2003).

Firstly, we have the Agent role. This is given to the entity that initiates the action described by the verb in a conscious way. This role is different from the Cause role, which is given to the entity that initiates the action described by the verb in an involuntary way. Consider the following examples of an Agent (19a.) and a Cause (19b.).

(19) a. O João comeu o bolo. / *John ate the cake.*
b. A tempestade afundou o navio. / *The storm sank the ship.*

Both these roles are usually assigned to Subjects of sentences, but in passive voice these roles are usually aligned with the Prepositional Phrase headed by the agentive preposition "por" (*by*). This difference in alignment between syntactic functions and thematic roles is interesting because it shows that a separate syntactic and semantic analysis is the best way to analyze the sentences for this project.

Regarding roles for Objects and Adjuncts, the list is a slightly longer. The Patient role is assigned to the entity that suffers the action caused by the Agent. Two subtypes of Patient are

distinguished: the Effected Patient, when the entity is a result of the action that is expressed by the verb (20a.); and Affected Patient when the entity already exists, but is causally affected by the action, changing some of its physical or abstract conditions (see, Raposo et al., 2013) like in (20b.).

There is a similar thematic role that is the one of Theme, which is specific for spatial location and transference between entities. The Theme can be assigned to entities that are static in one place (20c.), to those that move from one place to the other (20d.) and to those which are transferred from one person to the other (20e.). These descriptions are used by Raposo et al. (2013), but there are other authors like Dowty (1991) who consider Affected Patient, Effected Patient and Theme all belonging to a broader thematic role, the one of Proto-Patient. I will use this latter conception in my analysis.

(20) a. O médico inventou a cura. / *The doctor invented the cure.*
b. A rapariga bateu na irmã. / *The girl hit her sister.*
c. O cofre tem muito dinheiro. / *The safe has a lot of money.*
d. O João vai para a escola. / *John goes to school.*
e. O filho ofereceu uma gravata ao pai. / *The son offered a tie to his father.*

Another thematic role to be considered is the one of Experiencer. This role is attributed to entities that are the loci of any affective, sensorial or cognitive experience, as illustrated in (21).

(21) A minha família gosta de bacalhau. / *My family loves codfish.*

There are other roles worth mentioning such as Location – which is the place where the action occurs, example in (22) – and Manner –, which is the way the action, is performed, example in (23).

(22) O pássaro voou entre as árvores. / *The bird flew through the trees.*
(23) O João falou com delicadeza. / *John spoke in a gentle way*.

Although the list of thematic roles increases and diversifies over time, for the scope of this project, these are the most important ones to have into account, as I will not be using complex sentences with more than two thematic roles per sentence.

Having into account all these features and structures in Semantics, and joining them to syntactic structuring and organization, I have a solid framework to use for sentence analysis and control in the corpus for the main task.

2.3. The problem of Parsing

As I have stated, STI research needs influences from many areas of Cognitive Science. But, to explain the core of the problem I will be researching, I want to take a step back and talk about the main linguistic issue found in some articles on STI and Inference literature.

This section is organized in the following way: section 2.3.1 will address a model theory on how inferences are created and activated: the constructionist model; section 2.3.2 will address the main motivation for this project, giving examples from articles related to STI and other types of inference; and section 2.3.3 will try to justify my main motivation using Psycholinguistics' parsing theories which use brain correlates, mainly from ERP, as temporal expressions of language processing.

2.3.1. Constructionist theory for inference generation

Psychology was not unaware that text comprehension should comprise a complex process. Graesser, Singer & Trabasso (1994) discuss a model that explains how inferences of any kind are built by text comprehension, including a principle found in Bartlett (1932). This constructionist theory principle is called search-after-meaning, and it basically is created under three assumptions.

- The reader of the sentence searches for meaning representations that address their own goals. In fact, when talking about ITI, for instance, this seems to be true, as participants inhibit inferences that are not relevant to their intention.
- The reader builds meaning representations that are coherent. This means that while reading a text, for instance, the reader will have several inferences, but will organize them and deal with them so that there is no incoherence. A clear example for this would be reading a novel and attributing traits to a character, but never

attributing antonym traits to the same character, because it is hard to imagine a person that is both *Honest* and *False*.

- In order to achieve the coherence from the previous assumption, the reader tries to explain the cause for some actions or events. Continuing with the example from the character in the novel, the character might at some point lie to someone. Lying can be viewed as an action with an implied trait that is *False*. Being an *Honest* character, he cannot be false too, because it would be incoherent. However, the reader can explain this behavior by saying that the lie was for a greater good, and therefore the lie is now coherent, but there is no *False* implied trait.

By taking this theory, we can say that the reader inferences are knowledge-based, since they need the information given by the text and the context in order to coherently position them in the knowledge base for that fiction text.

The authors also state that we can classify inferences differently according to their context and their influence in the knowledge about the plot of the novel. However, much of these inferences are also linguistic inferences. For instance, the first class the authors refer is Referential inferences. This class of inference is clear in sentences like *John called Mary. She was sleeping.* The pronoun can only be fully understood if we know who the pronoun is referring to (the antecedent of the pronoun). We do it by inferring that the pronoun refers to Mary, because contextually speaking, it is the link that is grammatically coherent to the information given.

There is another inference that is closely related to linguistic processing: the case structure role assignment – where we attribute the thematic roles to the constituents by inference (also see section 2.2.2). The other classes of inferences (like state, emotion of reader, thematic etc.) are more related to psychological inferences, although they all use the text cue as source for the inference.

The authors reach a constructionist theory of inference with some assumptions. However, some of these are not as clear or as shared by everyone. For starters, there are three main information sources: the text, knowledge structures that we have either prepared for the specific purpose of incorporating text information and inferences, and the author's intentions and pragmatic environment of the reader. Secondly, the readers use three levels of encoding that are the surface code – comprised by the words and sentence structures present in the text –, the textbase – comprised by the explicit propositions and inferences for cohesion – and the

situation model – which is comprised by the information of the situation described by the text in a broader way.

Thirdly, readers have available three types of memory storages: the short-term memory – that stores the most recent information to be integrated –, working memory – that temporarily stores information the reader deals with while reading and while inferring –, and long-term memory – that stores information that was processed in working memory in a more permanent way. Although the authors think this assumption is uncontroversial, Psychology and Neuroscience have stopped distinguishing between short-term memory and working memory. In this case, the information is just stored temporarily in the working memory to be processed and then integrated into the long-term memory.

Fourthly, the reader's attention can be focused in any of the cognitive representations I previously mentioned. This means that the reader can pay more attention to the situation of the text, or maybe to the propositions and inferences, or even the syntactic structures.

There are other assumptions for this model, but for the following discussion they are not relevant. The fact is that this constructionist model, and the principle that is embedded in it (the search-for-meaning), predicts that inferences based in linguistic information are generated online, but those which are more related to the author or to their own emotion while reading are generated offline, by reanalysis or post-analysis.

It seems that linguistic control would disrupt or affect a model such as this one, and in fact most of the other theoretical models for inferences, like the minimalist hypothesis or the predication-substantiation model, insist that inferences closely related to Syntax and Semantic operations are done online. This means that not only they are primary, but they are also what gives the information for reanalysis in a recollection stage.

Knowing this, checking several experiments regarding text inference would be the logical next step, in order to think about what kind of use readers could give to these models, and what type of materials they are exposed in inference methodologies.

2.3.2. Linguistic control in inference and STI research

Saying up front, the main motivation I will be talking in this section is: inference literature – although it uses linguistic stimuli as a tool for inference, and although models like

the constructionist model for inference generation incorporate linguistic components from Semantics and Syntax as important parts – does not methodologically control or have into account linguistic features and structures. The only concern I have about this is that some of these features affect resources that the constructionist model deems as important for inference generation.

This lack of control is nothing new and I will present examples of corpora that date as far as 1977 to the present day to show that. The fact is that linguistic control is taken for granted, and the assumption is that a sentence such as *John ate Mary* and *Mary, John ate* can have the same level of implied traits and the exact same traits. And although some inference studies such as Ramos & Garcia-Marques (2006) and Ferreira, Morais, Ferreira & Valchev (2005) show that contextual endings to main behaviors can have different interpretations, in STI and other types of inference studies, the participants are presented corpora with sentences with different levels of linguistic complexity.

Dooling & Christiaansen (1977) studied retention in fiction texts, and the participants were presented a short text with 10 sentences each. Retention, in this case, would be equivalent to an inference about character features and emotions. And although the number of sentences was controlled, features like syntactic structure and text cohesion strategies are not controlled, or at least they are not explicitly controlled.

Albrecht & Myers (1995) also used short stories in order to understand how we process distant information. This task would create implications from various types, since the participants were asked comprehension questions about certain sentences in the text. The authors used texts in a controlled way, controlling text cohesion processes (by dividing the text into parts), and numbering the sentences in each part; but Syntax and Semantics were not, as far the authors explicit, fully controlled.

Prentice, Gerrig & Bailis (1997) used short texts to check if the reader profile can affect knowledge learning and inferences from texts. They used two versions of a short story with true and false statements regarding world knowledge. There is no mentioning of any linguistic control besides the number of true and false sentences in the text, and the fact that the text had 20 pages. They did this to participants from different universities in order to check if the answers were universal or had any variation, in this case, regarding from where the participant was. However, a text with 20 pages, from a Psycholinguistics point of view, has peaks of attention, and these are constrained not only by cognitive resources but also by linguistic features from Syntax and Semantics.

Regarding other types of inferences, the series of studies performed by Marsh also suffer from this same problem. Marsh, Meade & Roediger (2003), Marsh (2004) and Marsh & Fazio (2006, 2007) will be the main papers I will be observing. Marsh's stimuli for these studies are all fictional stories, and the author's main goal is to study general knowledge learning and false knowledge learning. There is no explicit linguistic control and each text usually had a length of two to three pages. However, the authors found interesting results regarding fiction as a good tool for learning, and as a primer for false world knowledge to be integrated.

As for STI, the researchers have not been so greedy as to use short texts for stimuli, but might still be using linguistic cues in an uncontrolled way. Most of the sentences in Uleman studies, for instance, have more than one verb, or complex constituents (like in, *Tom was so aggressive that he threatened to hit her unless she took back what she said*). Although Uleman's and other authors' findings are solid, and I am not suggesting that they are wrong, one cannot stop arguing that the inferences they get are the final product after all syntactic and semantic combinations of the different constituents.

However, different linguistic complexities might have different effects on trait inferences, and this was never studied over the vast literature tradition for STI. For instance, it is noticeable that when we infer from an action, we have a presupposition of how that action is performed. And, although some participants might have slight differences on picturing the manner of the action, there might be a "standard manner" assigned to the action, when manner is not explicit. By increasing linguistic complexity, and making the manner explicit through manner adverbs, we are forcing participants to focus on a particular manner setting, and this might filter the different trait inferences to just a smaller group.

So, the main motivation for this project – the lack of linguistic control over corpora in the different inferences' research – created a great question to be further analyzed, and that will be shallowly answered by the end of this project: do linguistic features, structures and complexities affect STI?

In fact, regarding sentence comprehension, Psycholinguistics has been trying to answer little by little how we integrate information during reading, a process very similar to what participants do during an STI methodology. If we also look at STI as a consequence of reading, then it is important to understand as deeply as we can what kind of smaller processes are involved. The next section will address two main Psycholinguistics models for sentence comprehension.

2.3.3. Parsing theories: Syntax-first and other views

Psycholinguistics has a vast tradition on models and theories regarding language processing. The parsing theories, as they are called, are just that: theories about human online processing while reading. Frazier (1979) describes the parser as a theoretical decoder of language that is time-bound and that uses cognitive resources, such as memory, for working. This parser also follows the grammar rules for the language, and its job is to follow syntactic, semantic and phonological principles for the reader to achieve comprehension of what he is reading.

In fact, there are two different views regarding parsing. One states that parsing uses the different components of language activating them in a serial way. Therefore, first Phonology would activate, then Syntax and then Semantics. The other view states that the components are activated online, as the linguistic information enters the parsing system, and that Syntax and Semantics interact with each other. Researchers have been trying to prove parsing theories not just by theorizing, but also by looking for answers in the brain ERP.

Friederici, Pfeifer & Hahne (1993) review a bit of the known ERP effects found in the literature. In general, participants are given sentences to read, with the ERP registering brain activity. However, these sentences have some anomalies from different linguistic components and features (for instance, structure anomaly and morphological formation of a word). ERP register potentials from the brain that can be positive or negative, and that can take place some milliseconds (ms) after the word is read by the participant.

One of the most classic ERP effects is called N400 (because it is a negative potential at 400 ms). N400 is shown to be a sign of semantic anomaly. For instance, if a word's meaning does not fit, or makes the whole sentence become unsound, this effect would appear. However, Friederici, Steinhauer & Frisch (1999) state that N400 does not occur when there is both a semantic and a syntactic violation, and that this effect has a larger amplitude for content words (such as nouns and verbs) than function words (like determiners and prepositions).

One way to explain these findings is by using a Syntax-first parsing theory. A Syntax-first theory asserts that while parsing, Syntax is the first component to be activated and constrains the other components to be activated. If this is true, and a sentence has both a semantic and a syntactic anomaly, since Syntax comes first, the parsing does not successfully reach the semantic anomaly, because the phrase structure violation would block the following lexical

integration (processing), and therefore there is no N400. In general, this would mean that Syntax influences Semantics.

Another ERP effect that has been studied is an early negative peak in the lateral anterior part of the brain. This peak might occur at about 100 ms (called early left anterior negativity, ELAN) or at about 300 ms (called left anterior negativity, LAN). According to Kaan (2007), ELAN has been observed when there is a basic phrase structure anomaly, usually related to the word category (p.e. noun, determiner etc.). LAN, however, has been associated with anomalies in morpho-syntactic agreement, phrase structure violations or agreement violations. These effects however, were deeply studied by many researchers, and despite the controversy behind what truly causes LAN to appear, some researchers have been studying this effect regarding cognitive resources, like memory, and not just syntactic processes.

Another syntactic ERP correlate is P600 (positive potential at about 600 ms). P600 have been attributed to subcategorization violations and errors needing syntactic reanalysis. The most common example to explain P600 are garden-path sentences. Take, for instance, the following example:

(24) The old man the boat.

Garden-path sentences are ones that while being processed the first time, and attributing them a syntactic structure, they do not make sense; but, after being syntactically reorganized, we can understand the true sentence structure. For (25), our first syntactic analysis would be like (25a.), but after reaching a point where we cannot parse the sentence anymore (due to the anomaly), we are forced to review the sentence and attribute a more grammatical structure like (25b.).

(25) a. [The old man]$_{NP}$ [the boat]$_{??}$
b. [The old]$_{NP}$ [man [the boat]$_{NP}$]$_{VP}$

It is because it needs this reanalysis that a P600 appears. Frazier (2015) talks about this regarding full parsing of a sentence, saying that sound sentences, to be sound, need more than a mere grammatical analysis of each constituent and then a grammatical interpretation. In fact, for a sentence to be fully parsed, reanalysis and repair are needed. An example of this would be, for instance, antecedent checking, where reanalysis is important to determine if the antecedent is well attributed and if the meaning is sound enough.

This type reanalysis can also be seen in a costly ambiguity related to Syntax research that is about attaching constituents (in this case relative clauses) higher or lower in the structure. This was studied by Traxler & Frazier (2008), where they give a sentence like (26) and leave for the readers choose which is the antecedent for the relative pronoun:

(26) John killed the waitress who was in the balcony.

The question is simple: "who was in the balcony?". At the first parse, this question arises to our parser. However, only by full reanalysis and incorporation, in this case antecedent attribution, the sentence makes sense. There are two possible antecedents for the pronoun: *John* (NP1) and *the waitress* (NP2). What the authors described and found out was that readers have a low attachment preference. If we transcribe sentence (26) as a parse tree we can understand that NP2 – the lowest antecedent in the tree – is preferred by the readers.

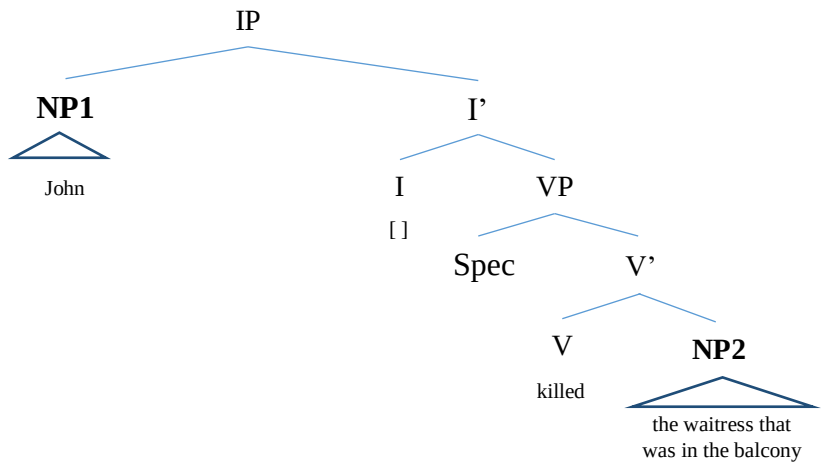

Figure 5 - Syntactic parse tree showing the two NP that a relative clause can use as antecedent.

This low attachment, according to Gibson (2000), is due to an integration cost. What this means is that attaching a constituent lower in the syntactic structure is less costly than the alternative. Since the parser is an economic processer, the preference for the less costly alternative becomes the preference. Also, readers have more difficult to process the sentence when they are forced to attach the relative clause to NP1.

Friederici, Steinhauer & Frisch (1999) also describe a negative ERP effect at about 700 ms related to semantic errors on the sentence. However, since it is so far in processing a sentence, even after P600 which is about syntactic reanalysis, a N700 related to semantics show that semantics is also reanalyzed. If we think about the ERP data about STI, we can position inference generation between syntactic and semantic reanalysis. From the reading

process's point of view, the reader validates Syntax and primary semantic operations, and it is only when Semantics is reanalyzed that inference is generated from the sentence.

All these ERP effects suggest that Syntax always takes precedence to Aemantics, and the first constrains the second (see Osterhout, Kim & Kuperberg, 2012). As for where in the brain these ERP effects take place, Osterhout et al. (2004) describe N400 as being activated in the posterior middle temporal lobe and the angular gyrus of the left hemisphere, and P600 in the left inferior frontal cortex. However, the authors state from the beginning that research assigning specific brain areas for Syntax and Semantics is recent and quite controversial.

However, despite this view of parsing, where the principles of language govern and contribute to sentence processing, there are other views regarding parsing, like frequency – as it is described by Weinberg (1999) –, and also having into consideration another component from language that I will not be viewing in this project such as Prosody and Phonology (cf. Carlson, Frazier & Clifton, 2009). However, it makes sense that other extralinguistic considerations, such as working memory, are to be considered in a full complete parsing theory.

As parsing theories suggest: if we do not take into account Syntax and Semantics (sentence structure and meaning), comprehension will be affected. Since inference information derives from linguistic cues, and usually complex ones, we cannot be completely sure where the inference comes from or how does it behave when we change or manipulate linguistic complexity, in a sentence or in a text.

Having a motivation and two different backgrounds to work with, it was time to choose which type of linguistic complexity I would use for this project. The next section presents a linguistic profile and description for manner adverbs.

2.4. Manner Adverbs

2.4.1. Why adverbs? Definition of adverbs

The first reasonable question is: why choose adverbs over any other class or linguistic complexity? Since, in the personality trait inference, the meaning attributed to the linguistic sequence is mainly derived from the verb, a suitable class would be one that modifies the

meaning and the attributes of the behavior described by the verb, and expressed in the sentence. Such class is called, in the grammar, adverb.

Another plausible manipulation in the sentence would be one that modified the Agent of the sentence. In fact, a class such as the adjectives would be suitable if such manipulation were to be used. However, after thinking about the inference mechanism, modifying the NP directly would weaken a sense of inference. In fact, attributing a quality directly to the NP would associate, rather than implicitly attribute, the traits in a much shallower way. This means that the participants would have the information for inference more present in the sentence and, even though it would still be an inference in the sense that I do not mention any trait in the sentence, the effect might have been weaker. This manipulation was discarded at an early stage of the project.

Differently from the adjectives, adverbs are adjuncts that can adjoin to both VP or IP (cf. Costa, 2004). However, the adjunct status of adverbs has been discussed by several researchers. Some of them, like Cinque (1999), position adverbs as specifiers, but others, like Ernst (2002, 2007), position adverbs as adjuncts that freely adjoin to various nodes in the syntactic tree (this theoretical stand is called Semantically Based Adjunction Theory). This last author also states that Semantics constrains adverb placement, since not all positions convey the same adverb meaning.

Costa (2008) defines three types of diversity in adverbs:

- morphological – where we can find adverbs which are composed (adverbs ending in *–mente*) and which are simple (like the adverb *yes*);
- syntactic – where we find adverbs in several positions of the sentence (preverbal, post verbal, end of the sentence);
- and semantic – where we have semantic classes of adverbs ranging from manner adverbs to quantity and polarity, among others.

Adverbs usually modify the meaning of the VP, specifically the head of the phrase, changing or adding information to the meaning carried by the element. For instance, consider the following sentences:

(27) a. O João comeu o bolo. / *John ate the cake.*

b. O João comeu <u>alegremente</u> o bolo. / *John ate the cake <u>joyfully</u>.*

c. O João comeu <u>parcialmente</u> o bolo. / *John ate the cake <u>partially</u>.*

d. O João <u>não</u> comeu o bolo. /*John <u>did not</u> eat the cake.*

In (27a.), we are given a situation where there is an Agent (see section 2.2.2) that performs consciously the act of *eating* on a Proto-Patient, something that suffers the act. We may imagine a boy grabbing a slice of cake and just putting it in his mouth. But now read (27b.). In this sentence, although the thematic roles are the same, we are given new information that changes the imagery we might get from the action. With the manner adverb "alegremente" (*joyfully*), we are imagining the same boy and the same slice, but now he is eating it with a smile on his face. In (27c.), another change happens. The quantity adverb "parcialmente" (*partially*) gives us information not on how the boy is eating the slice of cake, but how much of it did he eat. In this case, maybe the boy did not eat the whole slice. And, finally, in European Portuguese, the negative polarity adverb "não" (*did not* – which in English is composed by an auxiliary verb and the negative particle), does not add any type of information, but changes the polarity of the sentence, as shown in (27d.). This means that a positive sentence, over the scope of this adverb in that position, becomes negative.

So, as we saw, adverbs are great in what regards what they modify: they modify the behavior of the agent, not attributing anything directly to the Subject, but in a more subliminal way. Still, modifying the VP can be done in other ways like, for instance, the passive voice – where the syntactic functions change from one sentence to the other, while the thematic roles are the same, like in (28) and (29).

(28) O João – comeu – o bolo / *John – ate – the cake*

[Agent]	*[Proto-P.]*	*[Agent]*	*[Proto-P.]*
[Subject]	*[O. D]*	*[Subject]*	*[O. D]*

(29) O bolo – foi comido – pelo João / *The cake – was eaten – by John.*

[Proto-P.]	***[Agent]***	***[Proto-P.]***	***[agent]***
[Subject]	*[Pass. Ag.]*	*[Subject]*	*[Pass. Ag.]*

I had two main reasons for choosing adverbs. The first is that some of them are modal. What I mean is that they can modify the VP in a way where I can categorize the sentence with a trait or within a specific type of personality. In the case of the manner adverbs ending in *–mente*, which will be the focus of this project, since they are built with an adjectival base

and adjectives are usually what Psychology uses as traits (such as *Honest*, *Joyful* etc.), these manner adverbs can categorize the behavior which they modify in the personality spectrum.

The second reason, and equally important, given what was discussed in section 2.2, was linguistic control. As it is the case in many classes in the European Portuguese, many classes can be substituted by phrases. For instance, the adverb "calmamente" (*calmly*), can be exchanged by the adverbial phrase "de uma forma calma" (*in a calm way*). However, adverbs are a semi-closed class of words. This means that their creation is not as wide as it is with nouns, verbs or adjectives, but sometimes, especially in manner adverbs ending in *–mente*, we can build more and newer adverbs. By using morphological regularity, we can create several examples roughly with the same length and phonological weight, and certainly with the same syntactic importance.

The main problem while dealing with this class of words is their malleability and their diversity. There are several subclasses of adverbs, and when speaking of adverbs ending in *–mente*, there is at least one of these for each class. It becomes hard to know what kind of adverb would be the best candidate to create a reaction on a personality trait inference, since such manipulation was never tried in this subject's research literature. Because of that, in section 2.4.2, I will review the syntactic and semantic adverb classes to explain why we reached the conclusion that manner adverbs ending in *–mente* were a great candidate, and which ones we will be using.

Another problem regarding adverbs is, in Syntax, the debate for the adverb position in the hierarchical organization of a sentence. This discussion is a never ending one. Many postulate that adverbs are right adjoined to the end of the sentence; others defend that it moves upwards in the syntactic tree with the verb in order to gain a preverbal position. And the list goes on. To attain the desired linguistic control and observe minimal differences between sentences (because reading is such a delicate process – see section 2.3.3), I had to find a good place in the sentence for adverbial insertion, with a proper syntactic and semantic justification. This will be further analyzed in 2.4.3.

Only when all the factors align – the adverbial class, the syntactic function, and the semantic effect of its position – could we reason that the overall result of the sentences will create an inference of some kind. However, even before such linguistic control, it is still a mystery and a dangerous path to assume for certain how people parse the sentence. Even when the adverbs are chosen and controlled and positioned in the sentence, the reader could

parse the sentence abnormally, or having into account some unknown factors that were not considered.

2.4.2. Adverb Subclasses

So, as Costa (2008) describes, the first big rift in adverbial subclasses is a syntactic one. Consider the two following sentences:

(30) a. O João comeu o bolo alegremente. / *John ate the cake joyfully*.
b. O João comeu o bolo, alegremente. / *John ate the cake, joyfully*.

Even by reusing the same lexical entries, these two sentences find their difference in the syntactic position of the adverb, and the scope of what they modify. In (30a.), the adverb "alegremente" (*joyfully*) is used to refer the manner of the action, because it is modifying the VP. However, in (30b.), the adverb is modifying the whole sentence and not just the VP. In fact, the meaning of the adverb does not describe the way John ate the cake, but can be understood as a side note from the speaker of the sentence, giving his/her opinion on the action described in the sentence. Mind you that the written sentence was only modified by adding a comma, and in speech it would signify just a brief silence or a different tone to the adverb.

These are the two syntactic classes for adverbs: the ones which modify the VP, and the ones which modify the sentence (the IP). We want a VP modifier because we are only interested in modifying the action itself, without putting the Subject under the adverb's scope of modification. By being an IP modifier, as you can understand from Figure 4, it would modify not only the VP (and everything it contains) but also the Subject. There is a position in the sentence that I can use to deliver specific meanings to the adverb and force it to be a VP modifier. With this project, I wanted to prioritize the inference, and avoid simple semantic association. The post verbal position is also usually used for adverbs modifying the VP. This would be the most suitable choice for the task since it does not modify the Subject directly and it does not leave the option to be positioned as an IP modifier.

Adverbs, however, are quite numerous and have another way to be classified. Adding to this syntactic division, we can include a semantic classification to group adverbs. From this new classification, subclasses like manner adverbs, polarity adverbs and many others arise.

There are quite a few of these subclasses but the one which we will further analyze will be manner adverbs. And, before dwelling into the Semantics and Syntax of this subclass, let me show you why manner adverbs were preferred to other subclasses, like quantity adverbs. Notice that I am not talking about any other adverbs outside of the group of adverbs ending in *–mente*.

The first reason is a syntactic one: manner adverbs are, by standard, VP modifiers, especially in the post verbal position, as stated previously. The second reason was described earlier: adverbs ending in *–mente* (but not manner adverbs exclusively), are morphologically regular and are created by adding the suffix *–mente* to an adjective. And this adjective base for the adverb is the third reason for choosing manner adverbs ending in *–mente*. The adjective the manner adverb is formed with can be controlled in such a way that it can be closely related to the traits I will use in the main task. I only have to choose an adjective that is synonym or from the same semantic field as the trait I want to express in the sentence. Consider the following example, and a counter example with a quantity adverb:

(31) a. O João escreveu intensivamente o relatório. / *John wrote intensivelly the report.*

b. O João escreveu completamente o relatório. / *John wrote completely the report.*

Since the manner adverb in (31a.) was created using the adjective *intensive* and we use it to modify the verb *to write*, we build a Predicate that closely relates to a trait such as *Hard-working*. However, in (31b.), with a quantity adverb from the adjective *complete*, we have some sort of ambiguity between some traits such as *Hard-working*, or *Intelligent*, *Persistent*, and many others. With manner adverbs, although we still have a short range of possible traits, we can narrow them down to just a few traits, leaving some ambiguities behind.

2.4.3. Manner Adverb Semantics and Syntax

As stated previously, manner adverbs were the chosen subclass for this project. A simple definition of manner adverbs, proven by a substitution test, would be words that can be exchanged by the expression *in a ... way*. So, for instance, the adverb "alegremente" (*joyfully*) in sentence (32a.) can be substituted by "de uma forma alegre" (*in a joyful way*) like in (32b.).

(32) a. O João caminhou alegremente. / *John walked joyfully.*

b. O João caminhou de uma forma alegre. / *John walked in a joyful way.*

The common interpretation for a manner adverb, which is a VP modifier, is an agentive interpretation. This means that it is a manner adverb which has an Agent (cf. section 2.2.2) whose VP needs. For instance, a Predicate with a verb such as *to give* needs a conscious agent to perform the action. And if the adverb was to be inserted in the sentence, the meaning of the adverb would have the agentive interpretation, indirectly linking the adverb's meaning to the Subject. There are other interpretations, such as the causal and evaluative interpretation, but these would not convey a meaning interesting enough for trait inference – they would not connect the action, the way the action is performed and the Agent that performs the action in the way we wanted.

For this project, the semantic status of the manner adverbs was analyzed and controlled. However, interpretation in reading is still a wild card, and some participants might not be unanimous in interpreting semantic and syntactic sequences. In order to obtain the desired reading, I had to resort to some strategies that could narrow the interpretation possibilities, that I already mentioned before.

- Using an adverb morphological class that is formed regularly, from adjectives and that distributes the phonological weight and constrains the syntactic length of the sentence.
- A post verbal position that does not allow participants to parse the manner adverb as an IP modifier, but only as a VP modifier.

As for the second point, the debate over positioning adverbs is quite long and has taken researchers such as Ernst and many others to think about this for a while. I will be reporting just part of this debate, without taking a strong position over it.

For starters, it is quite normal to think about adverbs as very syntactically mobile elements. As we can see in (33), adverbs can be positioned almost in between every two elements in the sentence.

(33) (alegremente) O João (alegremente) deu (alegremente) o livro (alegremente) à Maria (alegremente). / *(joyfully) John (joyfully) gave (joyfully) the book (joyfully) to Mary (joyfully).*

However, the debate begins when we discuss about where in the sentence is the adverb originally located and generated. In Costa (1998), the author talks about three theories for adverb positioning.

- Free positioning – where the adverb is adjoined freely in the phrase directly.
- Base-generated positioning – where the adverb is adjoined to a base phrase, and it moves inside the phrase until it reaches the desired final position. However, some positions become unavailable and semantically anomalous if such theory is the rule for adverb positioning.
- Spec-Head agreement with different heads – a theory defended by Cinque that states that adverbs are formed in a position of a specifier in a functional head, for instance an aspectual node in the sentence. But since this is not a theory I will be considering, I will not focus on this.

Regardless of where the original position of the adverb is, the final position of the adverb is what we can better control, and it makes a difference not only in syntactic scope but also in the adverb's interpretation. Let us consider the sentences in (34).

(34) a. O João beijou a Maria gentilmente. / *John kissed Mary gently.*
b. O João beijou gentilmente a Maria. / *John kissed gently Mary.*
c. O João gentilmente beijou a Maria. / *John gently kissed Mary.*

In (34), we compare three adverb positions: end of the sentence, post verbal and preverbal, respectively. (34a.) and (34b.) share the same interpretation of Manner (substituted by *in a … way*). Both these adverb positions usually modify the way the action is performed, as it was explained in the beginning of this section. However, the manner adverb in (34c.) cannot share this interpretation with the others. In fact, if we were to use a substitution test to replace the adverb, it would not be with *in a … way* test, but rather with a *it was … of him to*. So, to test this, (34c.) would become (34d.) with this test:

(34) d. Foi gentil do João beijar a Maria. / *It was gentle of John to kiss Mary.*

With this test, we can perceive that the adverb does not change the way John kissed Mary, but rather associates a quality directly to the Subject of the sentence. The literature calls this the Subject-Oriented interpretation of an adverb, and this interpretation has an intensive relationship with the Subject of the sentence (see Díaz-Negrillo, 2014).

This would seem a good option for trait inference. In fact, such an interpretation would attribute a trait to the Subject (in this case the Agent of the action), which would make the trait inference stronger and easier. However, what I wanted to find out with this project is that if the participant given just subliminal or indirect information about the agent's behavior the inferred trait would change or not. Therefore, the adverb position in (34c.) was avoided, because it inhibited a Manner interpretation, and I wanted a condition where only the manner of the action was influenced by the adverb, without influencing the Subject.

Overall, the most natural position from a syntactic and semantic point of view for manner adverbs in European Portuguese is the post verbal one. This position commonly conveys a manner interpretation to the adverbs, but in some cases would also leave a Subject-Oriented interpretation available, not constraining any further analysis in the project. This Subject-Oriented interpretation availability opposed to cases where only the Manner interpretation is available would pose as an interesting condition opposition to analyze in each sentence of my corpus later on.

Having explored the best semantic and syntactic configuration for the adverbs to be used in the main task, I had all I needed to proceed with building the corpus and the main task.

3. Corpus

3.1. Creating the Traits

The first thing to be considered was which traits would be used. In fact, following a specific personality trait theory would be limiting this project. Whether it is Eysenck (1951) or Cattell (1965), any personality theory would help in creating the pairs of traits for the main task, but would not suffice to be comprehensively used as a source for the corpus.

In Ramos & Garcia-Marques (2006), the authors present a table with several trait pairs attributed to behaviors expressed in sentences. The trait pairs in this article also served as partial source, joining the ones taken from the personality theories mentioned before. At the end, we got nine trait pairs, each one with two antonyms (one with a positive polarity, and one with a negative polarity), shown in Table 2. The notion of polarity is usually used in the field of Semantics, in Linguistics, as a way to distinguish affirmative and negative sentences. However, seen from another perspective, the polarity of the traits can be seen from the point of view of who we are forming impressions of: if a trait has positive polarity, that person would have a more positive and pleasant personality; but if the trait has a negative polarity, then that person's personality will be more negative and grim. This was the polarity notion I used.

Positive Polarity	**Negative Polarity**
Cuidadoso / *Careful*	Desastrado / *Clumsy*
Honesto / *Honest*	Falso / *False*
Inteligente / *Intelligent*	Inculto / *Uncultured*
Violento / *Violent*	Calmo / *Calm*
Generoso / *Generous*	Egoísta / *Selfish*
Trabalhador / *Hard-working*	Preguiçoso / *Lazy*
Sociável / *Sociable*	Introvertido / *Introvert*
Caloroso / *Warm*	Frio / *Cold*
Alegre / *Joyful*	Triste / *Sad*

Table 2 - List of traits separated by emotional polarity

It is important to remember that these traits are not confined to any particular axis of the personality theories previously mentioned. If we look at Eysenck's theory, we have traits from the Melancholic (*Introvert*), Phlegmatic (*Careful*, *Calm*), Choleric (*Violent*) and Sanguine (*Happy*, *Sociable*) axes. If we look at Cattell's, we have some traits that can be found in several of his theory's axes like, for instance, the axis for Social Boldness, Liveliness, Perfectionism and Tension. These traits were chosen so that I do not focus solely on one type of personality traits, or just in one axis of personality.

3.2. Sentence Characterization

In order to legitimate the necessity of linguistic control for STI, the sentences were created from scratch controlling the number of syntactic constituents present. Although I do not expect any effect from, for instance, the type of Objects used in the sentence, or between verb Objects and verb Modifiers, I have analyzed each sentence in order to prevent the sentence complexity to be so wide that the linguistic control might be compromised.

That being said, I chose 50 verbs: some of them transitive, which accept an internal argument – whether it is a Direct Object, an Indirect Object or a Prepositional Object –; others are copulative verbs; and even verbs that have a Modifier (for more about verb classes, see section 2.2.1). Verb governments were controlled using the tests I had at my disposal to identify the different verb arguments.

Two of the verbs, namely "tratar" and "ficar", were used two times but with distinguishable meanings (even more when they are described in English) – the verb "tratar" had the meaning *to take care of* and *to treat someone* (cf. Tratar, 2013); and the verb "ficar" had the meaning *to stay* and *to become* (cf. Ficar, 2013). Finally, regarding the use of the verbs, there is one of them that was repeated, but with a difference in the Condition it was used in. I am specifically talking about the verb "esconder" (*to hide*).

As for the remaining syntactic constituents, each sentence was composed by a NP – with a definite article determiner and a proper noun – and a VP – generally, composed by a verb in the Past Simple (Pretérito Perfeito do Modo Indicativo) and its Object or Modifier. When the verb had an Object in the sentence, the Direct Object was composed by a definite article determiner and a noun; the Indirect Object was composed by the preposition "a" (*to*) contracted with a definite article determiner, and a noun; and the Prepositional Object was

composed by a preposition, a determiner (optional) and a noun. When the verb had a Modifier instead of an Object, the Modifier was composed by a prepositional phrase (PP) containing a preposition, a definite article determiner, and a noun. I chose the standard constituent order for European Portuguese – SVO: Subject, Verb and Object – in order to minimize any order effect derived from syntactic emphasis.

By the end, the corpus had 53 simple sentences, which were categorized with a trait in an intuitive way. However, in this first categorization, for the traits *Uncultured* and *Lazy*, the behaviors described in the sentences could barely be categorized in those traits or in their antonyms. This type of categorization allowed me to have some choices for conditions after having the results for the pretest, because it was expected that the pretest results differed from this first categorization. The full corpus can be found in APPENDIX I.

3.3. Pretest

In order to see if the first categorization was correct, every sentence was pretested with 79 participants (56 students from the Faculty of Psychology, and 23 students from the Faculty of Letters, both faculties belonging to University of Lisbon). Both these groups were analyzed separately at first, and then analyzed together, to verify if there was any difference between the two groups.

The purpose of this pretest was not just to create Conditions to be used later in the main inference task. Since these sentences were built from scratch, I needed to have empirical data on what was the trait inferred for each situation, prior to any adverbial modification. Then, in the main inference task, with the adverb modifying the action, we would have a way to understand what changed regarding STI before and after the manner adverb insertion.

For the pretest, participants were given a quiz with each sentence and, below each sentence, there was a list of all the traits from my nine pairs in no particular order, so that no trait was excluded from the participants' choice. They were given an instruction to relate any of the traits to the sentences, and they could choose up to three traits per sentence. However, if the participants could not relate the sentence with any of the given traits, they could choose none of the traits and move on to the next sentence. The participants had no time limit and, after completing the quiz, they were informed of the objective for this research.

3.3.1. Pretest results

Overall, the pretest results were very conclusive. Firstly, the response rate – the percentage of people that answered according to the instructions they were given with at least one trait – was 90.8 %. The average number of traits answered by sentence was 1.6 trait and almost all of the corpus' sentences had at least one trait activation. The concept of trait activation is used, in this case, to refer a trait which was chosen by more than 50 % of the participants, which would be a trait that was highly inferred by participants for the action expressed in the sentence.

Looking at the two groups of participants separately, the trait activation pattern is very similar. Using the identification numbers from the first column in APPENDIX I, in sentences 2, 6, 8, 16, 18, 23, 26, 27, 28, 29, 37, 38, 46, 47, there were trait activations that appeared or disappeared from one group to the other. However, these differences were not significant, and the percentage of choice for the main traits was still high. Overall, even in the marginal trait choices – the traits that the participants chose the less – the two groups were in agreement.

Looking at the two groups together, overall, every sentence had at least one trait activation, except for the sentences 26, 37, 49 and 50, where no trait activation was found, and we considered these sentences neutral and too wide to infer just one trait from them. The interaction between both of these groups, in a way, served to verify which traits were indeed activated, since one of the groups had a bigger number of participants than the other.

There were several interesting groups of results:

- in sentences 1, 7, 8, 9, 12, 14, 15, 16, 17, 19, 22, 23, 25, 31, 35, 36, 39, 42, 44, 45, 46, 48, 51, 52, the participants activated the most the trait I had proposed on my first category;
- other sentences had a single trait activated, but it was different trait from my first categorization activated – like sentences 3, 4, 5, 10, 21, 27, 28, 32, 40, and 43;
- some sentences – namely sentences 2, 11, 13, 20, 29, 34, and 38 – had more than one activation, and the most activated trait was different from my first classification;
- in the specific cases of sentences 33 and 53, the participants activated two traits with the exact same values (respectively, 50 % and 66.67 %);

- in sentences 6, 24, 30, 41, 47, where it was expected to see the antonym trait to the one I first chose, the participants did not surprise and activated this or other trait;
- and, finally, sentences 18, 26, 37, 49 and 50 had no trait activation.

APPENDIX I presents which trait was highly activated and how much percentage of people chose that same trait. At last, we could group the sentences by trait activations, resulting in a distribution that created the Conditions for this task (see section 3.4.). From all the traits, only two of them had no activation in all the sentences for all participants in the pretest: *Uncultured* and *Honest*. I called these traits Empty Traits. Regarding the trait *Honest,* however, there were two sentences that almost had an activation (almost 50 % of the participants chose it) but it was not enough to be accounted as an inferred trait.

3.3.2. Pretest results' discussion

The pretest results allowed me to conclude right from the start that the majority of the behaviors described in the sentences elicited personality traits. This conclusion is due to the trait activations that, as I mentioned before, were found in almost all of the sentences, except on the neutral ones (sentences 18, 26, 37, 49, 50). Besides these ones, each sentence had one trait (or more, in some cases) that was activated – and, therefore, inferred.

Since the average of answers given by the participants in each sentence was not even 2 (1.6 traits per sentence), we can state that participants were selective and did not infer many traits from just one situation per sentence, even though they had several traits to choose from. On the other hand, the participants tended to answer with at least one trait, reassuring the assumption that the behaviors expressed in these sentences, even without manner adverbs, elicited personality traits for inference. In some sentences, specifically in the most neutral sentence in my corpus – sentence 37 "O Tiago saiu de casa" (*Tiago left the house*) – some participants tried to project some behavior-related personality traits that were not explicit in the sentence such as *Violent* or *Sociable*, but they did it in a non-relevant amount.

Picking up from the group of results seen in the pretest and in the previous section, part of my first classifications was confirmed by the participants. However, my prevision regarding my first classification not being 100 % accurate also came through, showing that some of the behaviors were poorly labeled prior the participants' input. Also, there were some neutral sentences that had no significant activation, which means they had no inferable trait just "out

of the blue" (without any context for the sentence). This diversity on the results, combined with participants choosing few traits per sentence. showed how thorough and selective the participants were during the task.

The next step would be to organize this data and the sentences into conditions, according to the pretest trait inference configurations, and think of conditions that would allow me to observe the effect of manner adverbs in personality trait inferences, in a clear and diversified way.

3.4 Conditions

After the pretest results, I created four conditions to study the changes caused by manner adverbs inserted in the sentences: conditions Control, Opposite, Different and Empty. Each sentence was labeled with a corresponding condition letter (the condition name's first letter) and a number.

Condition Control had sentences with no adverb at all. The sentences for this condition followed some criteria: (i) the sentence had no trait activation in the pretest or (ii) the sentence had no trait activation superior to 60 %. A total of ten sentences were labeled for this condition (from C1 to C10).

Condition Opposite had sentences with an adverb whose meaning was closely related to the antonym of the trait inferred by participants in the pretest for those same sentences. This means that, if a sentence had been categorized with the trait *Careful* in the pretest, the adverb should be created from an adjective closely related to the trait *Clumsy*. The sentences for this condition followed some criteria: (i) there was, at least, one trait activation superior to 60 % and (ii) the trait that was activated in the pretest, or the most activated one if there were multiple activations in the sentence, was the same trait I first categorized the sentence with in the beginning. Therefore, a total of 21 sentences were labeled for this condition (from O1 to O21). One of the sentences, O20, was discarded due to be a repeated situation in this condition, and to balance the condition itself.

Condition Different had sentences with an adverb whose meaning was closely related to the first trait I intuitively had categorized those sentences in. This means that, if a sentence was categorized in the pretest with the trait *Sociable*, and the first trait I had intuitively

categorized it with was *Happy*, the adverb would be created from an adjective closely related to this latter trait (*Happy*). The sentences for this condition followed some criteria: (i) there was, at least, one trait activation superior to 60 %, and (ii) the activated trait in the pretest, or the most activated trait when there were multiple activations in a sentence, had to be different from my first intuitive trait categorization, or (iii) they had two highly activated traits with the same value. A total of 18 sentences were labeled for this condition (from D1 to D18). Afterwards, in order to logically balance the conditions in number, sentences D19 and D20 were added to this condition, since they had a big activation in a different trait from my first intuitive trait categorization, but this activation was not the biggest activation obtained in the pretest. By the end, I had 20 sentences for this condition.

Finally, Condition Empty had sentences with an adverb whose meaning was closely related to an Empty Trait. An Empty Trait, as previously stated, is a trait that had no trait activation in any of the sentences during the pretest. We only categorized two traits as Empty: *Uncultured* and *Honest*. This Condition was created after I joined both groups' pretest results. The sentences for this condition followed some criteria: (i) the trait I intuitively categorized the sentence with was not activated during the pretest in any sentence, (ii) the sentence was eligible to other condition, such as condition Opposite, but one of the other three traits to be rated during the main task (see sections 4.3. and 4.3.1.) involved an Empty Trait – for example, if a sentence was intuitively categorized with the trait *Intelligent*, and the pretest had confirmed it, the trait for the adverb to be related to would be *Uncultured*, one of the Empty Traits, and the sentence would be inserted in Condition Empty but not in Condition Opposite. A total of nine sentences were labeled for this condition (from E1 to E9). Afterwards, in order to balance the Conditions in a logical way, I added sentence E10, since it almost had an activation of an Empty Trait (42.86 %). By the end, I had 10 sentences for the condition.

Concluding, the labeling for each sentence can be observed in the second column of APPENDIX I.

3.4.1 Hypotheses

Since manner adverbs act as verbal modifiers, it would be unlikely not to have any effect on personality trait inferences. However, what can we expect from this type of modification without prior research about this matter?

Well, taking for granted a main and broader hypothesis that manner adverbs create personality trait inferences, adding or changing traits that were not seen before the adverb insertion; a more specific hypothesis is needed. If we think about personality profile and the results found by Asch (1946) regarding implicit personality theory, personality is malleable, but coherent. If manner adverbs act to modify verbs, and traits to be inferred as a consequence, they have to change it in a coherent way. Let us see it from the perspective of each condition created for this project.

In condition Opposite, since I insert a manner adverb that is related to the antonym trait that of the sentence without it, there is a collision between the two traits available. It is not coherent to have both antonym traits available for inference since it is somewhat hard to imagine a person who is selfish and generous at the same time. So, one of the traits has to be preferred by participants as the inferable one. My hypothesis for this condition is as follows: since manner adverbs modify the verb and the action, the trait introduced by manner adverbs will stand out due to the opposition and the adverb-related trait (AT) will have a higher rate than the verb-related trait (VT).

In Condition Different, the AT and VT do not conflict with each other. In fact, this condition simulates how malleable changes in personality profiles can become. Think, for instance, that you notice someone assaulting other person – labelling the person who assaulted as violent –, but afterwards you notice that the person was doing that in a more gentle way than just simply assaulting – making you think that person is less violent, and more gentle or slightly calm. My hypothesis for this condition involves a disruption. This means that the insertion of the manner adverb does not necessarily make the VT disappear or be lowly inferred, but, in fact, I just expect both the VT and the AT to be equally rated by participants.

Finally, in Condition Empty, the AT was completely new and unrelated to the action stated in the sentence, since it was not highly activated in the pretest. In this case, either a disruption or a full shift is expected. Since this new trait is added by the verb modifier, the

AT might be rated higher than the VT. Therefore, I expect a difference between the two traits, where the AT is higher rated.

In general, all three of these hypotheses give inference primacy – or a heavier importance during personality trait inference – to the manner adverb and its trait, since the adverb is a verb modifier and, as all modifiers, it serves to provide additional information about the phrase it modifies. This means that this element will have an attention focus, which will give strength to the inference.

There is also a general hypothesis regarding a sentence-by-sentence analysis. If adverbs are truly important for changing and molding personality trait inferences, then linguistic factors, such as its interpretation or the verb government can act as facilitator or an inhibitor factor for inferences.

3.5. Adverb creation

The manner adverbs I used for this task always ended with the suffix *–mente*. To create such adverbs, I used adjectives that were synonyms to the traits (or semantically related to them). I, then, added the suffix due to this adverb's regular morphology.

I created a total of 33 manner adverbs having into account that more than one adverb would be necessary for each trait in the task. Doing this, the adverbs would be diverse enough to not stand out too much for the main task's participants. The full list of adverbs can be found in APPENDIX II.

3.5.1. Adverb positioning

As explained in section 2.4.3, I opted to insert the manner adverbs after the verb (post verbal position). This position for adverbs – whether authors take them syntactically as adjuncts or specifiers in the parse tree – affects the meaning of the sentence, and even the scope and power of the adverb over the meaning of the rest of the sentence's constituents. This forces participants to relate them only to the situation denoted by the verb, and indirectly link (rather than strongly associate) the adverb to the Subject, as also discussed previously.

Briefly mentioning what was discussed previously, when the adverb is in a post verbal position, the adverb modifies the way the Agent of the sentence executes the behavior. This position, for the main task, is better than a preverbal position – where the adverb associates its meaning almost directly towards the Subject of the sentence. The post verbal position would assure inference related to a Manner interpretation, even though a Subject-Oriented interpretation for the adverb could also be available and have some effect in the analysis.

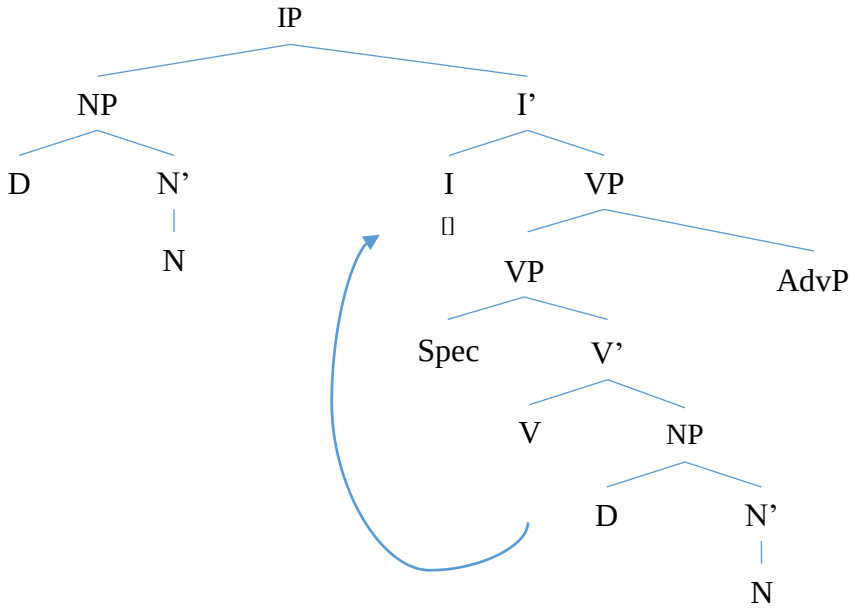

Figure 6 - General syntactic structure for the corpus' sentences with the manner adverb insertion

4. Main Task

4.1. Participants

In order to obtain a personality trait inference effect with the same weight as the one I had on the corpus pretest, I opted to use a similar number of participants. Therefore, we presented the main task of personality trait inference to 61 participants. They were chosen under some criteria: (i) the participants should be no more than 40 years old, (ii) they should speak fluently European Portuguese as a first language, (iii) and they should be enrolled in an academic degree (bachelor's or master's degree) in any university, or be an alumni of some academic degree (bachelor's or master's degree).

Also, none of the participants knew about the main task or the theme of the project, being naïve before undergoing the main task.

4.2. Lists of stimuli

The sentences on the corpus were divided into four lists with 20 sentences each. Each list had five sentences from each condition (Control, Opposite, Different and Empty). Each participant would only be presented one of the lists, and each sentence in the list would only be presented one time. The sentences from conditions Control and Empty were repeated in two lists, but always in different lists and with different distributions, since I had only 10 items for each condition (from C1 to C10, and from E1 to E10), opposed to the other conditions (from O1 to O21 – and excluding O20 –, and from D1 to D20). The sentence distribution in each list is found in Table 3.

I chose 59 neutral face photographs from Minear & Park (2004) database as a tool to represent the sentence's Agents. Each participant never saw the proper names used to refer a person in a sentence repeated in any of the other sentences of his or her list.

	List 1	List 2	List 3	List 4
Condition Control	C1	C6	C1	C2
	C2	C7	C3	C4
	C3	C8	C5	C6
	C4	C9	C7	C8
	C5	C10	C9	C10
Condition Opposite	O1	O2	O11	O12
	O3	O4	O13	O14
	O5	O6	O15	O16
	O7	O8	O17	O18
	O9	O10	O19	O21
Condition Different	D1	D2	D11	D12
	D3	D4	D13	D14
	D5	D6	D15	D16
	D7	D8	D17	D18
	D9	D10	D19	D20
Condition Empty	E1	E3	E1	E2
	E2	E4	E3	E4
	E5	E7	E5	E6
	E6	E8	E7	E8
	E9	E10	E9	E10

Table 3 - Sentence distribution over the four possible stimuli lists.

4.3. Inference Task

The task was performed in the Faculty of Letters' library, in University of Lisbon, inside a small room with no distractions and a quiet environment, with only a chair to sit down and a table with the computer where the stimuli was to be presented. E-Prime build 2.0.10.252 was used to build the stimuli presentation of the lists and an Asus T200 computer was used to individually present the stimuli to the participants.

As it was previously said, I intend to study the effect on personality trait inference using a rating methodology. Carlston & Skowronski (2005) used a similar way to study STI, but I put the focus on the sentence manipulation and its effect on the inference mechanism. In this study, I use ratings from 1 (*trait does not describe the person in the photograph at all*) to 7 (*trait completely describes the person in the photograph*).

This rating methodology is divided in three stages: the training stage, the distracter stage and the test stage.

Figure 7 - The main task's stages

At first, the participants received the basic instructions on how the experiment would develop. I told them that I was studying memory on social behaviors and that they had to memorize, as best as they could, the information that I would present them. Afterwards, I further explained them that I would present a series of face-sentence pairs: one sentence describing a social behavior, and a photograph of the person that had that behavior. I remembered them that they should memorize not only the information in the sentence but also the photograph, because I would test their memory afterwards regarding all this. Finally, I informed them they had no time limit for memorizing.

After clicking in any key, a fixation symbol (#) appeared for 50 ms, followed by the face-sentence pair. The photograph was centered and in the upper half of the screen, with the name of the person below the image; and the sentence was presented with a font size of 25 in the lower half of the screen. The Subject of the sentence was always the proper name of the person in the photograph and the list of stimuli was presented in a random sequence. To get to the next face-sentence pair, the participants had to click the Space key. When they did it, the fixation symbol would reappear and the cycle would continue until all 20 sentences from the list attributed to that participant were presented.

When all sentences were studied, a slide with new instructions would be presented. I, in any case, explained the participants that they had to solve math problems that would be presented in the screen without writing on anything. This type of distracter is widely used in many memory and impression formation methodologies. The math problems had the basic operators (summation, subtraction, multiplication and division), and I only used integers. The

participants were given no time limit to solve all ten math problems, whose answers had always three digits. After giving each answer, the participants were given feedback stating if they were correct or not, presenting the correct answer if they had answered wrong.

Finally, after solving all the distracters, the participants were informed that, before I tested their memory, they would have to rate – from 1 to 7 – four personality traits for each person they saw before in the photographs. To do that, a photograph that was previously presented in the first stage of the main task appeared in the upper half of the screen, with the person's name below, and a rating scale from 1 to 7 was presented in the lower half of the screen with the name of the personality trait they were rating. The participants had to rate the traits using the numeric keys on the keyboard. The four personality traits they had to rate for each person were presented one immediately after the other. So, participants rated all four personality traits for the first photograph, then all four traits for the second photograph, and so on. These traits were chosen following the criteria presented in the next section.

After evaluating four traits for 20 photographs, a message would appear informing the participants that the experiment had ended and that the researcher would fully debrief them on what was being studied with this methodology and in this project.

4.3.1. Choosing the presented traits

As previously stated, a total of four traits were presented separately, one immediately after the other, for each photograph. Two of those traits would be the critical ones which we will analyze in section 5.: namely the AT and the VT. But choosing the other two traits besides the AT and VT, the filler traits, was also an important task. It made sense to be thorough when choosing these filler traits, in order not to raise the attention of the participants during the rating stage. Therefore, I followed some criteria for each condition.

For condition Control, since I had no critical traits to analyze, I chose, for each sentence, the two traits that had the highest score in the pretest, and the two traits that had the lowest score in the pretest.

For condition Opposite, I chose for fillers the trait with the second highest score in the pretest and its antonym. I had to add some exceptions due to the variety in the pretest results. In this case, the exceptions were related to the Empty Traits. If the second highest score in the pretest belonged to the antonym trait of an Empty Trait, I would have to pick the third highest

score. This was done so that Empty Traits were as new as they could be to the participants, even in the rating stage of the main task, excluding in Condition Control, which had not this type of constrain due to not having any manner adverb.

For condition Different, I chose for fillers the two traits that had the lowest score in the pretest. I applied the same exception as in condition Opposite. In addition, if the VT was the AT's antonym, the filler traits would follow the criteria for filler traits in condition Opposite. Finally, if both VT and AT shared the same emotional polarity (positive or negative), both filler traits had to respect it and be of the same polarity as them.

For condition Empty, I chose for fillers the trait with the highest score and the trait with the lowest score in the pretest. However, when the highest score belonged to the Empty Trait's antonym, the rules for the fillers were the same as in condition Opposite. The rules for polarity described in condition Different were also applied.

So, in the end, the distribution of the four traits for each sentence is as is shown in APPENDIX III.

4.4. Acceptability post-test

After the main task, I wanted to find correlations between the ratings from the main task and individual linguistic features from Semantics and Syntax in the sentences. One of the first issues raised was the semantic acceptability of each sentence. Each sentence of the corpus was grammatical and had a proper functional syntactic structure, but, in the end, the sentence could have sounded semantically anomalous or weird to the participants. Semantic acceptability could be a factor that gives inference strength and preference either to the VT or to the AT. The fact that the verb Modifier (the manner adverb, in this case) contradicts or does not properly fit in the sentence's situation and semantic structure might give it an advantage in processing, therefore standing out when forming impressions about the Subject of the sentence (see first hypothesis in section 3.4.1).

In order to position each sentence in an acceptability rating, I built a quiz in Google Forms, published it online and shared it with potential participants. All of them were European Portuguese native speakers. Each participant was labeled with two initials, and they

had to answer how sound each sentence was from 1 (*not semantically sound at all*) to 7 (*completely semantically sound*).

A total of 50 participants answered this quiz and the mean ratings from each sentence for this task were presented in APPENDIX IV and analyzed in section 5.2.

4.5. Sentence-by-sentence Analysis

To verify linguistic constraints and features that affected the sentences in a regular way, I did a sentence-by-sentence analysis for possible factors that might disrupt STI based on the theoretical framework presented in section 2.2. First of all, I labeled each sentence with the type of argument the verb had in each sentence (whether it was Direct Object, Indirect Object, Oblique Object or just a Modifier). Then, I labeled each aspectual class for each sentence, and I labeled each thematic role regarding the Subject and the other constituent present in the sentence other than the verb and the adverb.

Regarding the adverb influence in the sentence, we contrasted both the polarity of the verb and of the adverb (the notion of polarity here is still based on if the constituent transmits a good or bad quality to the Agent). We also checked what adverb interpretations were available, between a Subject-Oriented interpretation and a Manner interpretation. To obtain thorough data, I combined some of these factors and analyzed them together – namely semantic acceptability, thematic role analysis and available adverb interpretation.

5. Results

5.1. Inference task results

For the gross analysis of the data obtained in the main task, the different sentences for each condition were viewed as a simple repetition of a condition. This means that this statistical analysis was disregarded the singular linguistic characteristics from each sentence. A more thorough analysis can be found in the following section. Of the 50 sentences from conditions Opposite, Different and Empty, almost all of them had a preference for the VT or the AT, except for two of them (sentences D13 and D19), which had the same mean rating value for both traits.

First of all, the Mauchly Sphericity Test revealed that the assumption of sphericity holds, $p = 0.06$ ($p \geq 0.05$). Thus, I ran a repeated-measures ANOVA measures for the Conditions (Control X Opposite X Different X Empty) X 4 lists X 2 Ratings (VT vs. AT). The mean ratings per condition were indeed different, $F(3, 171) = 7.9352$, $p = 0.00006$ ($p \leq 0.05$). Also, the mean rating value was 4.01 in their inferences. As for condition Control, the value for both main traits to be analyzed (highest rated in the pretest) was not significant – $t(60) = 1.0172$, $p = 0.15659$ ($p \leq 0.05$) – which corroborates the pretest results, where there were no significant inferences from the sentences in these conditions. Table 4 shows the mean trait values for the VT, a trait obtained from the pretest results and the mean trait values for the AT throughout the different conditions.

	VT		**AT**	
	Mean Rating	**Std. Error**	**Mean Rating**	**Std. Error**
Condition Opposite	4.061	0.119	3.799	0.126
Condition Different	4.406	0.132	4.347	0.118
Condition Empty	3.843	0.115	4.105	0.111

Table 4 - Mean rating values for VT and AT throughout conditions Opposite, Diffe*rent and Empty*

In condition Opposite, although there is a difference between VT and AT ratings, it is a non-significant effect – $F(1, 57) = 1.9749$, $p = 0.16535$ ($p \leq 0.05$). Even so, the fact that VT is higher than AT, contradicts my first hypothesis, where I stated that AT would be higher since the adverb modified the VP and it was the cause for the antonym opposition. However, this

was not the case. There was also no significant effect from list to list – $F(3, 57) = 0.28495$, $p = 0.83606$ ($p \leq 0.05$).

As for condition Different, there is almost no difference between VT and AT ratings – $t(57) = 0.42866$, $p = 0.334895$ ($p \leq 0.05$). This goes accordingly to my hypothesis: inferences for different (but related) traits than those found in the pretest are rated as high as the traits from the pretest, but there is no inhibition from the pretest traits. This lack of inhibition can be explained since the AT and the VT are somewhat coherent with each other while building a psychological profile for the Subject of the sentence. There is some variance from list to list, but it is not significant – $F(3, 57) = 2.4015$, $p = 0.07708$ ($p \leq 0.05$).

Finally, for condition Empty, there was a significant difference between VT and AT ratings: AT is rated higher than VT in a significant way – $t(57) = 1.8948$, $p = 0.0316$ ($p \leq 0.05$). This confirms my hypothesis: if a trait is completely new, both in study phase and in recall phase for conditions with manner adverb insertion – and if the trait is not inferable from the sentence without the manner adverb (as seen in the lack of activation from any of the sentences in the pretest) – the participants rate this new trait higher when an adverb related to it is inserted in the sentence. However, there are significant differences between VT and AT ratings in between lists – $F(3,57) = 5.4839$, $p = 0.00222$ ($p \leq 0.05$). Table 5 presents the values main differences between mean rating values of VT and AT between the four lists.

	VT		**AT**	
	Mean Rating	**Std. Error**	**Mean Rating**	**Std. Error**
List 1	4.000	0.225	3.725	0.217
List 2	3.413	0.232	4.573	0.224
List 3	4.520	0.232	4.387	0.224
List 4	3.440	0.232	3.733	0.224

Table 5 - Mean rating values for VT and AT for Condition Empty between the four stimuli lists.

Finally, there is a marginally significant interaction between the four conditions and the ratings for VT and AT – $F(3, 171) = 2.5361$, $p = 0.05845$ ($p \leq 0.05$). These differences, and the other statistical effects found suggesting adverbs importance in STI, were a good motivation for a sentence-by-sentence analysis. Since each sentence might react differently to parsing and language processing, it is not a surprise that there is room for variation.

5.2. Sentence-by-sentence linguistic analysis

This analysis will have into account several of the linguistic factors talked in section 2.2, and will not have into account the conditions from the main task. In this type of analysis, I am interested in the linguistic features and their effect in STI preferences and not the task's conditions. So, for each sentence in the three conditions with manner adverb insertion (conditions Opposite, Different and Empty), I analyzed semantic acceptability, verb government, aspectual class, verb and adverb polarity, adverb interpretation, and thematic roles for the Subject and the verb Objects or Modifiers. I analyzed each factor individually, and then proceeded to combine some factor analyses with the acceptability rate. APPENDIX IV shows the main task's mean VT and AT rating for each sentence with their corresponding post-test's acceptability rating.

I will start by analyzing semantic acceptability – which was obtained from the post-test –, aspectual class and verb government. Sentences which had the same rating value in the main inference task for both VT and AT were considered as situations where a preference for inferring the AT happened. This is due to the fact that both sentences in this situation are part of conditions where the AT was in a semantically coherent situation, which puts this trait in disadvantage when compared with the VT, which would not be inhibited by the insertion of the adverb. If AT's rating could get on the same level as VT's, the presence of the adverb would be the factor that caused that. The values for these situations, however, will be presented between parentheses in following result tables, next to the total number of cases where AT was higher rated (incorporating both the cases where AT mean ratings were higher than VT's and cases where they had the same mean rating value).

I analyzed sentences by presenting two different values: the first is the gross number of sentences which had the VT rated higher (pVT) and the gross number of sentences which had the AT rated higher (pAT); the second is the mean difference between the higher rated trait and the lower trait rate for situations where VT was rated higher (a value which I will designate as dVT) and for situations where AT was rated higher (a value which I will designate as dAT). Results for pVT and pAT will show how frequently VT and AT are rated higher, and dVT and dAT will show how strong these effects are.

The mean acceptability value was 4.29, which means that we should have enough data to analyze each level of acceptability (from 1 to 7). Acceptability ratings by themselves suggest that the more acceptable the sentence is, the more the participants prefer the VT over the AT.

However, the AT is still present and relevant. In fact, in sentences with a level of acceptability around 4 (which is neutral in my scale of semantic acceptability), participants are twice as likely to prefer the AT, despite the VT being preferred in higher levels of acceptability. However, there is a tendency regarding the strength of these preferences as we climb the acceptability scale: the more acceptable the sentences are, the weaker is the effect for AT preference. Table 6 shows rating preference by level of acceptability.

	VT		**AT**	
Acceptability Rating	**pVT**	**dVT**	**pAT**	**dAT**
1.00 – 1.99	1	0.200	3	1.400
2.00 – 2.99	4	0.483	4	0.357
3.00 – 3.99	5	0.926	4	1.089
4.00 – 4.99	3	0.922	6	0.967
5.00 – 5.99	7	0.832	6 (1)	0.280
6.00 – 6.99	5	0.360	2 (1)	0.250

Table 5 - Number of sentences with higher VT and AT ratings, and their respective mean differences, having into account post-test acceptability ratings results.

Other factors like, for instance, the aspectual class of the sentence have some marginal preferences. For instance, Achievements have a higher pAT, but a weaker effect (having dVT slightly higher than dAT), and Activities show a higher pVT, but a weaker effect as well (having dAT higher than dVT). Accomplishments have no preference at all, having the same number of preferences for VT and AT, but the effect is stronger for VT (with a higher dVT). As for the rest of the aspectual classes, I do not have enough data to conclude anything significant. Table 7 shows the number or preferences by aspectual class.

	VT		AT	
Aspectual Class	**pVT**	**dVT**	**pAT**	**dAT**
Achievement	6	0.644	9 (1)	0.621
State	3	0.710	1	1.533
Semelfactive	1	1.000	2	1.056
Activity	7	0.623	5 (1)	0.783
Accomplishment	8	0.724	8	0.601

Table 6 - Number of sentences with higher VT and AT ratings, and their respective mean differences, having into account each sentence's aspectual class.

As for verb government, there are no significant effects. Direct Objects do show a higher pAT, but a weaker effect (since dAT is lower than dVT). In fact, when taken together, Objects in general have a slightly higher pAT, but the dAT is still slightly lower than dVT. Table 8 shows the number of preferences for the VT and the AT by verb government.

	VT		AT	
Verb Government	**pVT**	**dVT**	**pAT**	**dAT**
Direct Object	12	0.670	17 (1)	0.540
Indirect Object	1	1.227	1	1.400
Oblique Object	9	0.669	6 (1)	1.009
Object (in general)	22	0.695	23 (2)	0.636
Modifier	2	0.600	1	1.800
Subject Predicative	1	0.667	1	1.533

Table 7 - Number of sentences with higher VT and AT ratings, and their respective mean differences, having into account verb regency in each sentence.

Since Syntax had nothing substantial to add about the importance of manner adverbs in STI, semantic factors like thematic roles, polarity and adverb interpretation were analyzed. For thematic role analysis, we took into account three types: analysis of Subjects' thematic roles, analysis of Objects and Modifiers' thematic roles, and analysis of the interaction between Subjects' and Objects and Modifiers' thematic roles.

As for Subjects' thematic roles, I found a slightly high pAT when the Subject is an Agent. The value for dAT is also slightly higher than dVT, which suggests that participants not only rate the AT higher than the VT more times, but they also do it with a stronger difference of rating values than when the opposite case occurs. As for the Proto-Patient role, I have

insufficient data to make some conclusions. However, it seems that the VT is preferred more times but with a lower dVT, which suggests that the strength of this effect is weaker than when participants prefer the AT. Table 9 shows the analysis for Subjects' thematic roles.

	VT		AT	
Subject Thematic Role	**pVT**	**dVT**	**pAT**	**dAT**
Agent	21	0.677	23 (2)	0.700
Proto-Patient	4	0.732	2	0.923

Table 8 - Number of sentences with higher VT and AT ratings, and their respective mean differences, having into account subjects' thematic role for each sentence.

Regarding Objects and Modifiers' thematic roles, there are no significant effects. There are interesting signs, however, of possible effects on Proto-Patients, with a higher pAT and dAT (a frequent and strong effect for preferring the AT). As for other thematic roles, it seems that the VT is preferred more times but with a lower dVT than dAT. Table 10 shows the values for this analysis.

	VT		AT	
Object / Modifier Thematic Role	**pVT**	**dVT**	**pAT**	**dAT**
Proto-Patient	17	0.625	20 (1)	0.696
Company	3	0.638	2 (1)	1.017
Recipient	2	0.610	0	-
No Role (Copulative Verbs)	2	0.948	1	1.533
Location	1	1.000	0	-

Table 9 - Number of sentences with higher VT and AT ratings, and their respective mean differences, having into account verb objects and modifiers' thematic role of each sentence.

However, there is an interesting effect when we combine both analyses. When the sentences express a relationship between an Agent and a Proto-Patient, there is a high pAT. This effect, however, is weaker – because dAT for these cases is lower than dVT. Although I have few data, when the sentence expresses a relationship between an Agent and some entity that accompanies the Agent in the same action (typically with a thematic role of Company), the data shows a high pVT, but, again, with a lower dVT and therefore a weaker effect. Table 11 shows the number of trait preferences by thematic role.

Subject – Object / Modifier Thematic Role	VT		AT	
	pVT	**dVT**	**pAT**	**dAT**
Agent – Proto-Patient	16	0.652	21 (1)	0.623
Agent – Company	3	0.638	2 (1)	1.017
Agent – Recipient	2	0.610	0	-
Proto-Patient – No Role	2	0.948	1	1.533
Proto-Patient – Cause	0	-	1	0.313
Proto-Patient – Proto-Patient	1	0.200	0	-
Proto-Patient - Location	1	1.000	0	-

Table 10 - Number of sentences with higher VT and AT ratings, and their respective mean differences, crossing both subjects, and objects and modifiers' thematic roles.

Polarity was another factor I had into account. To remind this concept, polarity, in the sense I will be using it, refers to an emotional response or attachment to, in this case, the VP and the adverb. This means that even if the sentence is affirmative (with a positive linguistic polarity), we can have a VP like "odiar o João" (*to hate John*) with a negative emotional polarity and "adorar o João" (*to love John*) with a positive polarity. Polarity analysis was done to both the VP and the adverb, and the analyses considered several possibilities. Significant effects are found when we analyze polarity only looking at one element at the time. Table 12 presents this first analysis.

Constituent Polarity	VT		AT	
	pVT	**dVT**	**pAT**	**dAT**
Negative VP	7	0.564	13 (1)	0.799
Positive VP	18	0.737	12 (1)	0.576
Negative Adverb	11	0.855	10 (1)	0.584
Positive Adverb	14	0.446	15 (1)	0.791

Table 11 - Number of sentences with higher VT and AT ratings, and their respective mean differences, having into account VP and Adverb Polarity separately.

As the table shows, there is a preference for positive elements, and with strong effects. In fact, when the VP has a positive polarity, I have found a high pVT and dVT; but when the adverb has a positive polarity, although pAT is only slightly higher than pVT, dAT is clearly higher than dVT. Negative polarities in VP or in adverbs lower, respectively, pVT, pAT, dVT

and dAT. When I analyze both VP and adverb polarities combined in each sentence, there is also a preference for positive polarity can be observed.

	VT		AT	
VP – Adverb Polarity	**pVT**	**dVT**	**pAT**	**dAT**
Negative VP – Positive Adverb	5	0.546	8	1.047
Positive VP – Negative Adverb	9	1.128	5	0.618
Negative VP – Negative Adverb	2	0.582	5 (1)	0.550
Positive VP – Positive Adverb	9	0.346	7 (1)	0.535

Table 12 - Number of sentences with higher VT and AT ratings, and their respective mean differences, having into account VP and Adverb polarity combined.

As the table shows, when the sentence has an element with a positive polarity and an element with a negative polarity, the positive element trait is preferred by participants. One interesting thing to notice is that when polarities are the same (such as Negative VP – Negative Adverb), although pVT and pAT show one trait preference, dVT and dAT show a contrary preference: when pVT is higher than pAT, dVT is lower than dAT, and vice versa. This factor would later be analyzed combining the acceptability ratings.

Finally, the last individual factor analysis was adverb interpretation. Although I could not be 100 % sure what interpretation the participants chose for the adverb during the encoding stage of the main task, I can narrow the options by observing which interpretations are available or not. So, for this analysis I had into account the two main interpretations for manner adverbs: Subject-Oriented and Manner interpretations. Since Manner interpretation is broader and more generalized than Subject-Oriented, I had two possible situations to analyze: when there was only Manner interpretation available, and when both interpretations were available. Table 14 presents the rating preferences for both interpretation availability situations.

	VT		AT	
Adverb Interpretation	**pVT**	**dVT**	**pAT**	**dAT**
Only Manner Interpretation	13	1.001	3	0.483
Manner & Subject-Oriented Interpretations	12	0.345	22 (2)	0.751

Table 13 - Number of sentences with higher VT and AT ratings, and their respective mean differences, having into account available Adverb interpretations in each sentence.

As the table shows, when the Subject-Oriented interpretation is available for participants to use, the participants show higher pAT than pVT, and this is also true for the strength of the effect (since dAT is higher than dVT). However, when Manner interpretation is the only one available, pVT and dVT are higher than pAT and dAT.

Since polarity, acceptability and adverb interpretation had the most significant effects and were, in fact, the most important factors on the list, I analyzed any interaction effects between acceptability and polarity, and acceptability and available adverb interpretation.

When we combine polarity and acceptability analyses, we can better understand how rating preferences behave when we have into account proper semantic structure of a sentence. Table 15 shows the results for this intersection.

		VT		AT	
Acceptability	**VP – Adverb Polarity**	**pVT**	**dVT**	**pAT**	**dAT**
1.00 – 1.99	**Negative – Positive**	1	0.200	3	1.400
2.00 – 2.99	**Negative – Positive**	3	0.489	2	0.490
	Positive – Negative	1	0.467	2	0.225
3.00 – 3.99	**Negative – Positive**	1	1.063	1	1.533
	Positive – Negative	2	1.301	1	0.040
	Negative – Negative	1	0.498	1	0.750
	Positive – Positive	1	0.467	1	2.033
4.00 – 4.99	**Negative – Positive**	0	-	2	0.833
	Positive – Negative	2	1.352	2	1.300
	Negative – Negative	0	-	2	0.767
	Positive – Positive	1	0.063	0	-
5.00 – 5.99	**Positive – Negative**	4	1.094	0	-
	Negative – Negative	1	0.667	2 (1)	0.233
	Positive – Positive	2	0.392	4	0.303
6.00 – 6.99	**Positive – Positive**	5	0.360	2(1)	0.250

Table 14 - Number of sentences with higher VT and AT ratings, and their respective mean differences, having into account both post-test acceptability ratings, and VP and Adverb polarity combined.

The polarity preference evolution throughout the acceptability scale was not uniform. In fact, in a broader way, participants had a preference for elements with positive polarity, almost from the lowest acceptability to the highest. However, when both analyzed polarities are the same, whether negative or positive, we can see what the higher rate trait is: the higher we climb in the acceptability scale, the AT becomes less preferred (although it still lingers in levels as high as 5 in the acceptability scale), but dVT gets higher than dAT. This, however, shows that the adverb insertion and its polarity still cause the AT to be highly inferred, even in semantically acceptable sentences.

Finally, since available adverb interpretation had such a high effect, I also analyzed it having into account the acceptability ratings.

		VT		AT	
Acceptability	**Adverb Interpretation**	**pVT**	**dVT**	**pAT**	**dAT**
1.00 – 1.99	**Manner Only**	0	-	0	-
	Manner & Subject-Oriented	1	0.200	3	1.400
2.00 – 2.99	**Manner Only**	2	0.700	2	0.458
	Manner & Subject-Oriented	2	0.267	2	0.256
3.00 – 3.99	**Manner Only**	3	1.222	0	-
	Manner & Subject-Oriented	2	0.482	4	1.089
4.00 – 4.99	**Manner Only**	1	1.438	0	-
	Manner & Subject-Oriented	2	0.665	6	0.967
5.00 – 5.99	**Manner Only**	4	1.244	1	0.533
	Manner & Subject-Oriented	3	0.283	5 (1)	0.229
6.00 – 6.99	**Manner Only**	3	0.511	0	-
	Manner & Subject-Oriented	2	0.133	2 (1)	0.250

Table 15 - Number of sentences with higher VT and AT ratings, and their respective mean differences, having into account both post-test acceptability ratings and the adverb interpretation for each sentence.

With the acceptability scale analysis combined with the available adverb interpretation analysis, we can see that the same effect found before: when Subject-Oriented interpretation is available for participants, either pAT is higher than pVT also with stronger effects), or pAT

and pVT have the same value, but dAT is still higher than dVT; but when manner interpretation is the only one available, dVT is always higher than dAT. When sentences are not semantically acceptable due to the adverb insertion, and Manner interpretation is the only one available, pAT is as high as pVT, but this marginal preference disappears as the sentences become more acceptable from the semantic point of view, and pVT and dVT get higher values. Overall, pAT for both available interpretation situations get higher than pVT as the sentence becomes more and more semantically acceptable.

APPENDIX V shows a table with all the linguistic factors analyzed in this section for each sentence.

6. General Discussion

In general, the main question was “increasing linguistic complexity in an STI paradigm corpus, by inserting a manner adverb in a sentence, would provoke differences in the inferred trait?”. In general, the data indicate that that is the case.

First of all, it is easy to understand that indication of manner has a consequence on how we view or picture any action or situation. All actions have manner. However, only when we make it explicit, we can filter the different ways of performing that action into one distinct way. The statistical data from this research shows just that. When participants are exposed to sentences with manner adverbs (main task), their inference preferences change from those they have when exposed to the same sentences (describing the same actions) without the manner adverb (pretest).

One first interesting remark is that the adverb’s syntactic scope in the parse tree is important for the inference. When confronting a VP and an adverb that allow antonym trait inferences (which is the case in condition Opposite of the main task), statistical data shows that participants infer, and therefore rate higher, the VT. Although the difference between VT and AT is not statistically significant, this suggests that VT takes precedence (is firstly inferred) and has domination (has a stronger inference) over AT when they are both in semantic opposition. This can be explained by Syntax. A VP adverb occurs in a Modifier position internal to the VP. So, in the parse tree, AdvP is part of the VP. The verb is still the head of the phrase and if the AdvP truly acts as a Modifier, generated in that position, then it is normal that, when parsing the sentence, the VT is more important than the AT.

The participants do not highly infer the AT over the VT in condition Opposite, which was a behavior contrary to my hypothesis for this condition. Even though it is the Modifier’s fault that the sentence is semantically anomalous, participants, as readers, parse the sentence syntactically. When they try to do semantic parsing, they fail when reaching the adverb because of the opposition, and therefore the AT might be marked as semantically invalid. For the task, the participants would choose the VT, which is available and was semantically processed in a successful way – because they processed the smaller VP (the one with the verb and its Objects). The fact that this difference was not statistically significant goes to show that the adverb (and the AT) interference is still strong in STI, although in most of the cases it’s not enough to overpower the VT.

Another interesting statistical effect was found in condition Different. In this condition, participants would have a VT and an AT that are both coherent with each other for the Subject's psychological profile building. This condition served to find out which element the participants more readily and strongly inferred when both syntactic and semantic parsing were successful. As I hypothesized, since both traits are coherent, when the manner of the action is made explicit, the AT is as high rated as VT (since the difference is not significant). If the VT rating was inferior to AT rating, we could explain it by thinking that a combination of a verb and an adverb was parsed as a different verb – so, *kicking* would be a verb, and *kicking violently* would be a different "verb". The result I found makes sense, because since manner is explicit, the AT which is deeply related to the manner is available for participants to infer. This effect is one clear sign that any increase on linguistic complexity, in this case by inserting a manner adverb, might make new traits available for inference.

The last of the statistical effects I wound found was in Condition Empty. This condition's hypothesis stated that the AT would rated higher. The difference from this condition to condition Different was that, in condition Different, the AT was coherent with the VT and was somewhat expected, since they were chosen by some participants in the pretest; but in condition Empty, however, there was no expectation towards the AT, since it was not activated once in any of the sentences by none of the pretest participants. I believed that the lack of trait expectation, and since it was a completely new trait, would leave the AT more prompt to be inferred by participants. This was the case, since AT had significant higher than the VT.

The importance of the effects found in condition Different and Empty add importance to an urge for linguistic control in corpora for STI research. The danger of STI literature not taking into account linguistic complexity was never comprehended, but with this data, and with just a manner adverb, in both these situations I changed the trait availability for inference: in condition Different, we added one coherent (but somewhat expected) trait to the ones available for inference; in condition Empty, we added one unexpected trait.

This makes me wonder what would happen if we tested for more types of linguistic complexity. If adverbs have the potential to add traits available for inference – although not inhibiting the original traits that could be inferred from the sentences without the adverb –, maybe other types of linguistic complexity, like auxiliary verbs, adjective insertion, constituent position and many others would elicit some interesting effects that can be further researched.

Despite these statistical results, a sentence-by-sentence analysis was needed if I was to further understand what linguistic features were crucial and important for the statistical effects observed. I, then, gathered the main features used for analysis: namely, semantic acceptability, the situation's aspectual class, verb government, available adverb interpretation, VP and adverb polarity, and constituent's thematic roles.

The measures I used were the number of sentences where one trait was preferred – pVT for when the VT was preferred; and pAT, for when the AT was preferred – and the rating difference between the higher rated trait and the other crucial one – dVT for sentences which had VT rated higher than AT; and dAT for sentences which had AT rated higher than VT. These two measure values served to better understand two characteristics from STI: pVT and pAT served to verify which trait was viewed as the more easily accessed when encoding and inferring about the sentences; dVT and dAT served to verify how robust and strong was the effect found.

The sentence-by-sentence analysis showed that semantic features such as adverb interpretation and polarity are more important than syntactic features. On one hand, this is not strange, since the only syntactic feature I analyzed that could interfere with inferences is the argument structure of the verb occurring in each sentence. This is acceptable since we inserted the adverb in the same position for all sentences, maintaining a fixed syntactic structure, and therefore, the big difference between pretest sentences and the main task sentences was adding the adverb to the sentence.

Sentences with manner adverbs, show few trait preference effects regarding the sentences' aspectual class. Participants rated AT higher more times when the sentences expressed an Achievement, but the effect would be weaker than when VT was higher rated. Also, Activities had the opposite behavior to Achievements. Accomplishments, however, had the same number of cases in which VT and AT were rated higher, but the effect for VT was higher than for AT. So, for aspectual classes, I do not have a conclusive way of saying which trait (either the VT or the AT) was preferred by participants, or if aspectual classes were important at all. This should be an interesting linguistic feature to be further researched in the future for STI, since the aspectual class of situations deals directly with features from the action itself, which is the source for personality trait inference.

As for thematic roles, the data suggested that when the connection was between an Agent and a Proto-Patient – which is referred as a big thematic role that incorporates Affected Patients, Effected Patients and Themes (see Jackendoff 1972, Jaeggli 1986; Dowty, 1991,

a.o.) –, AT was higher rated more frequently, but with a slightly weaker difference when compared with the sentences that had VT rated higher. In these cases, it seems that participants are more sensible to the way the action is performed, and therefore the AT becomes more present in the mental organization for available traits to be inferred.

When the Object or Modifier, however, denoted not an entity that suffered an action, but one that would accompany the Agent in it, with a thematic role of Company, although the AT shows a stronger effect, VT is preferred more frequently. In this case, it seems that what action was performed, and not the way it was performed, is more important to participants. So, when there is a receiving end of an action, manner is more important; but when both entities are together in an action, what matters is what action were they performing. Of course that thematic role manipulation would be an interesting future research for this field, in order to fully understand if these results are true in a larger scale and with a larger sample and corpus.

Another interesting way of studying STI behavior would be having into account thematic roles by changing the consciousness of the syntactic Subjects (being an Agent or a Cause). Since Todorov & Uleman (2002) stated that the actor of the behavior is the center for STI, it would be interesting to understand if the actor behaving in a conscious or unconscious way has an impact in STI.

The Semantics of the adverb, however, showed greater signs of being important for trait inference. This was more noticeable when analyzing adverb interpretation, semantic acceptability of sentences, and VP and adverb polarity for each sentence.

As for the acceptability rating from the post-test, it seems that AT is more frequently and more strongly rated higher when the sentence is semantically anomalous, but the more acceptable the sentence is, the less important the adverb becomes. So it seems that how semantically sound a sentence is can create different traits to be higher rated. For polarity effects, the higher rated trait was from the constituent which had a positive emotional polarity, and with a stronger effect. It seems that participants are prioritizing traits that are related to emotional positive constituents. However, when both the VP and adverb are positive, the frequency and the strength of the rating effects were not coherent.

When we combine polarity analysis and semantic acceptability analysis, we can observe that the VT, overall, is preferred the more semantically sound the sentence is. However, looking at each unit from the semantic acceptability scale, a positive constituent trait-related

preference can be observed. The preference for the AT in low acceptability ratings is also very strong, and it can even override the positive polarity preference (as in the case from 2.00 – 2.99, where AT is preferred in two sentences against one sentence preferring VT). But, as we climb the acceptability scale, and we have the constituents with the same emotional polarity in the sentence, AT is more frequently and more strongly preferred, except on the higher levels of the acceptability scale (where VT is more frequently preferred).

In short, this analysis showed that the positive polarity preference can be clearly observed, but also that even in high levels of semantic acceptability, the adverb interference changes the inferred trait, although in the best semantically acceptable sentences the participants inferred the VT more times and with higher values.

More importantly, the core of the adverb's semantics, which is based on how the adverb is interpreted by the participants, showed significant evidence about manner adverb's importance for STI. Since Subject-Oriented and Manner interpretation are the two most important ones for manner adverbs, I analyzed each sentence in order to understand what interpretations were available in each sentence. Since manner is an interpretation that is always available for manner adverbs in that position, the question was if a Subject-Oriented Interpretation was available or not.

The data suggests that if Subject-Oriented Interpretation is available for participants, AT is rated higher more frequently and strongly. However, when only Manner Interpretation is available for participants, they rate VT higher and with higher values than AT. This effect can actually be predicted by syntactic and semantic parsing of a sentence. When Manner interpretation is the only one available, participants view the adverb truly as a Verb Modifier, and then, as statistical data from this research showed, the fact that is modifying a VP, and V is still the head of the phrase, VT takes precedence and dominates over the AT. However, when Subject-Oriented interpretation is available, manner adverbs – although being syntactically modifying the VP – are being more closely linked to the Subject, much like a predication over the Subject. Semantic parsing would attribute the AT to the Subject in an easier way and, therefore, be more readily to be inferred from the sentence.

This is still the case even when we combine available adverb interpretation analysis and semantic acceptability analysis. As for the case when only Manner interpretation was available, the same trend from the acceptability analysis stands: the lower the acceptability of the sentence is, the more frequently and strongly preferred the AT is. As for the case when Subject-Oriented interpretation is available, AT is as frequently preferred or even more, and

with higher rating differences, in all semantic acceptability scale from this project. This effect clearly shows that, if not properly controlled, adverb insertion can change which trait is more readily and strongly inferred from a sentence, changing an STI methodology result.

All the data suggest that linguistic complexity, but specifically manner adverbs, is very important for STI. Even though effects throughout STI research literature are solid and significant, one cannot wonder whether the inferences obtained from the corpora used would be different if the sentences were linguistically controlled. Just by inserting a manner adverb, not only could I make a non-important trait important, but I could also make a non-relevant trait relevant. The several linguistic factors (such as adverb interpretation and semantic acceptability) taken into account suggest and add arguments to the importance of Linguistics' framework in a methodology used in Social Cognition.

These effects also show something interesting for Linguistics. The fact that the VT takes precedence and dominates over the AT when there is a semantic contradiction between verb and adverb, shows that positioning AdvP as a VP modifier generated in that position is consistent with empirical data from this STI research. If it were in any other way, the AT should have a bigger effect even with a Manner interpretation or with semantic contradiction. Thus, it will be worth pursuing further research in this area and about these matters, both in theoretical and experimental ways.

One idea for further investigation would be using different positions in the sentence or using the manner adverb as an IP Modifier. As for the different positions, this would make it possible to test the different adverb positioning theories, and to search for empirical data from STI to corroborate any one of them, as well as best position in the syntactic structure to make STI higher; as for the change in modifying scope (IP vs. VP), it would further observe how far goes the effects found, since in an IP-modifying condition the adverb would not be under the scope of the VP – modifying just the verb and its Objects – but it would be parsed along with the Subject – which in it would be syntactically modifying.

STI research could even give more arguments for the discussion about syntax-first parsing models vs. linguistic modules activating at the same time. When creating a condition that puts Syntax and Semantics one against the other, we could understand what is activated first while processing a sentence. Such condition would be created by using active and passive voice sentences. Uleman's research has found that the actor is the center for the inferable traits, but this type of condition would also pose the question "is it the Agent of the situation, or the Subject of the sentence?". Since the Subject from the passive voice sentence

is not the Agent of the situation, we could possibly observe a double dissociation between thematic roles and syntactic functions. To test this, the corpus used would have active voice sentences with Agents / Experiencers and a Theme; and their corresponding forms in the passive voice to verify where is the inference stronger or even faster.

There is also something that was not further researched in this project, but that might create yet another step towards better understanding STI. In all literature, authors assume that STI by behavioral observation or by processing a text are the same effect or, at least, follow the same conceptual constraints as to how inferences are created and inhibited. However, as this project showed, linguistic modification in the latter situation produces a change not only in the linguistic structures but also in the participants' inferences. Still, since my methodology used solely linguistic cues as inference vehicles, it would be interesting to understand if manner modifications in behavioral observation also changes STI.

As it was previously said, manner adverbs are explicit cues for manner in a situation. Putting this into images or videos is not an easy task, but it is doable. To study this, a methodology incorporating a linguistically controlled corpus would have to be used again. Combined with this linguistic corpus, an image corpus with the same situations would also have to be studied by the participants. To create conditions that could allow us to differentiate and to observe up close both these effects, manner would have to be explicit and implicit in both corpora. Manner, in a behavior, can be suggested by several characteristics like iteration (repetition), instrument and facial expression.

I will use an example to clarify this methodology: *Paul attacked John*. Participants would, probably, have to choose to rate traits like *Violent* and *Calm*. The situation can be pictured in a simple video of one person beating the other for the control condition (the one with no change manner). To appeal for a manner that would elicit the inference of a trait like *Violent* we could apply manipulations like: a video of one person beating the other many times would simulate iteration; a person beating with a bat instead of his fists could simulate a change in instrument; and the facial expression of the attacker during the assault would simulate the internal attitude of the actor of the behavior. As for the linguistic corpus, conditions of manner manipulation like the one I used in this project would be used to compare trait inferences.

A methodology such as this one would provide data to understand if inferences by linguistic cues and by behavior observation are, in fact, two processes, or one in the same, by applying explicit manner constraints to the situations, like a manner adverb does. If there are

differences between inferences created by language processing and behavior observation, the constraints that bind linguistic complexity manipulation (like manner adverb insertion) are not the same ones for behavior observation, suggesting a difference in how inferences in both cases are created.

Still on this matter, it would be interesting to fact-check the other side of the methodology: to understand how participants are processing language and behavior. Simply asking for the participant to describe or to choose from many adverbs which one would describe the situation he just saw – or by asking the participant what did he imagine after reading a sentence – would provide clues for what type of information is shared between language comprehension and social behavior mental picturing.

Finally, further research about linguistic complexity importance in STI would be able to uncover what is the linguistic priority chain of factors for STI. For instance, since Linguistics takes the Inflection node (which contains Tense, Mood, Person and Number) as the core of the sentence, would the effect be bigger if I added temporal conditions expecting different STI? Regarding what type of constituents we add on to a sentence, which syntactic class (noun, adjective, adverb etc.) causes the bigger effect?

In sum, it seems that the manner adverb became a trigger for new traits or existent (but unimportant) traits to become more readily inferred or to be strongly inferred when reading a social behavior description. Linguistic analysis shows that semantic factors like thematic roles, semantic acceptability and adverb interpretation seem to be important for the organization of the different traits that could be inferred when reading a sentence with a manner adverb. It was never the objective for this project to find definitive answers for questions like *how are traits prioritized in our mind?* or *exactly what linguistic features are crucial for inference?*. Since the field of Linguistics has been somewhat neglected in Social Cognition, this project served to show that there is more to linguistic structures than just using them arbitrarily, which might mark a new stage for STI research involving linguistic control for the corpora.

One thing is certain. This project showed that there is plenty to find out regarding linguistic complexity in Social Cognition. We are still far from being able to fully understand how inferences are made and organized when presenting texts to people. But studies like this one, suggesting the importance of linguistic control for STI corpora, are a step forward towards Linguistics being a powerful ally for Social Cognition in better understanding STI.

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APPENDIXES

APPENDIX I – Corpus: Sentences without Adverbs, with the pretest results.

# Pretest	Main Task Code	Sentence	Pretest Trait	Score	% of response
1	O1	A Marta tropeçou na Carla. *Marta tripped on Carla.*	Desastrado *Clumsy*	98.70	97.47
2	D1	A Luísa cuidou da Sara. *Luísa cared for Sara.*	Generoso *Generous*	74.36	98.73
3	E1	O Ricardo ajudou o Fernando. *Ricardo helped Fernando.*	Generoso *Generous*	89.97	100.00
4	D2	A Carla escondeu o sorriso. *Carla hid the smile.*	Introvertido *Introvert*	76.32	96.20
5	C9	A Sofia aconselhou a Joana. *Sofia advised Joana.*	Generoso *Generous*	55.07	87.34
5	D16	A Tatiana aconselhou a Cecília. *Tatiana advised Cecília.*	Generoso *Generous*	55.07	87.34
6	E2	A Bárbara tratou da Patrícia. *Bárbara cared for Patrícia.*	Cuidadoso *Careful*	70.42	89.87
7	O2	O Artur pontapeou o David. *Artur kicked David.*	Violento *Violent*	97.40	97.47
8	O3	A Rebeca sossegou a Manuela. *Rebeca calmed Manuela.*	Calmo *Calm*	67.53	97.47
9	O4	O Alexandre alimentou o Frederico. *Alexandre fed Frederico.*	Generoso *Generous*	89.47	96.20
10	D3	A Mariana empurrou a Jéssica. *Mariana pushed Jéssica.*	Violento *Violent*	97.33	94.94
11	D4	O Bruno leu os livros. *Bruno read the books.*	Inteligente *Intelligent*	80.28	89.87
12	O5	O Gabriel ficou no sofá. *Gabriel stayed in the sofa.*	Preguiçoso *Lazy*	97.26	92.41
13	D5	O André divertiu o Tomás. *André amused Tomás.*	Alegre *Joyful*	89.74	98.73
14	O6	A Raquel continuou calada. *Raquel kept quiet.*	Introvertido *Introvert*	82.67	94.94

15	O7	O Mateus abraçou o David. *Mateus hugged David.*	Caloroso *Warm*	88.00	94.94
16	O8	O Rodrigo abandonou o Henrique. *Rodrigo left Henrique.*	Frio *Cold*	64.47	96.20
16	D19	O Nicolau abandonou o Alexandre. *Nicolau left Alexandre.*	Frio *Cold*	64.47	96.20
17	O9	A Cecília festejou com a Adriana. *Cecília celebrated with Adriana.*	Alegre *Joyful*	84.62	98.73
17	D20	A Catarina festejou com a Carolina. *Catarina celebrated with Carolina.*	Alegre *Joyful*	84.62	98.73
18	C1	O Tiago chorou com o Rúben. *Tiago cried with Rúben.*	Triste *Sad*	49.32	92.41
19	O10	A Jéssica perdeu a carteira. *Jéssica lost the wallet.*	Desastrado *Clumsy*	95.95	93.67
20	D6	A Nicole estudou as matérias. *Nicole studied the subjects.*	Trabalhador *Hard-working*	84.81	100.00
21	E3	O Samuel salvou o Gustavo. *Samuel saved Gustavo.*	Generoso *Generous*	67.61	89.87
22	E4	A Paula mentiu à Sofia. *Paula lied to Sofia.*	Falso *False*	94.81	97.47
23	E5	A Alice resolveu o problema. *Alice solved the problem.*	Inteligente *Intelligent*	85.53	96.20
24	C10	A Manuela gozou com a Mariana. *Manuela mocked Mariana.*	Falso *False*	56.00	94.94
24	E6	A Isabel gozou com a Nicole. *Isabel mocked Nicole.*	Falso *False*	56.00	94.94
25	O11	A Júlia ameaçou a Cecília. *Júlia threatened Cecília.*	Violento *Violent*	84.42	97.47
26	C2	O Filipe concordou com o Cláudio. *Filipe agreed with Cláudio.*	Honesto *Honest*	42.86	62.03
26	E10	O Luís concordou com o Vítor. *Luís agreed with Vítor.*	Honesto *Honest*	42.86	62.03
27	C8	A Beatriz elogiou a Júlia. *Beatriz complimented Júlia.*	Caloroso *Warm*	54.55	83.54
27	D7	A Tatiana elogiou a Catarina. *Tatiana complimented Catarina.*	Caloroso *Warm*	54.55	83.54
28	D8	O Bernardo roubou o Nicolau. *Bernardo stole from Nicolau.*	Falso *False*	70.13	97.47

29	D9	O Paulo tratou do problema. *Paulo solved the problem.*	Inteligente *Intelligent*	60.00	94.94
30	D18	A Joana acabou a tarefa. *Joana completed the task.*	Trabalhador *Hard-working*	90.41	92.41
31	O12	O Rafael convidou o Nicolau. *Rafael invited Nicolau.*	Sociável *Sociable*	85.71	97.47
32	D10	A Carolina cumprimentou a Eduarda. *Carolina greeted Eduarda.*	Sociável *Sociable*	86.67	94.94
33	C4	O Eduardo acusou o Rodrigo. *Eduardo accused Rodrigo.*	Frio *Cold*	50.00	65.82
33	D15	O Vítor acusou o Gabriel. *Vítor accused Gabriel.*	Frio *Cold*	50.00	65.82
34	D11	A Maria brincou com a Beatriz. *Maria played with Beatriz.*	Sociável *Sociable*	80.77	98.73
35	O13	O David desistiu da vida. *David gave up on life.*	Triste *Sad*	84.62	98.73
36	O14	O Lucas caiu no buraco. *Lucas fell into the hole.*	Desastrado *Clumsy*	96.15	98.73
37	C5	A Laura saiu de casa. *Laura left home.*	Sociável *Sociable*	35.48	39.24
38	C3	O Frederico sorriu para o Bernardo. *Frederico smiled at Bernardo.*	Sociável *Sociable*	58.44	97.47
38	E7	O José sorriu para o Miguel. *José smiled at Miguel.*	Sociável *Sociable*	58.44	97.47
39	E8	A Adriana enganou a Débora. *Adriana fooled Débora.*	Falso *False*	93.67	100.00
40	D12	O Gustavo venceu a corrida. *Gustavo won the race.*	Trabalhador *Hard-working*	88.73	89.87
41	E9	O Miguel respondeu ao Lucas. *Miguel answered Lucas.*	Sociável *Sociable*	71.93	72.15
42	O15	O Henrique gritou com o Rodrigo. *Henrique yelled at Rodrigo.*	Violento *Violent*	72.00	94.93
43	D13	A Eduarda conversou com a Bárbara. *Eduarda talked with Bárbara.*	Sociável *Sociable*	88.73	89.87
44	O16	A Sara ofereceu presentes. *Sara offered gifts.*	Generoso *Generous*	90.79	96.20
45	O17	O Fernando escondeu o bolo. *Fernando hid the cake.*	Egoísta *Selfish*	76.12	84.81

46	O18	A Juliana analisou o documento. *Juliana analyzed the document.*	Trabalhador *Hard-working*	73.97	92.41
47	D17	O Cláudio arrumou o quarto. *Cláudio cleaned the room.*	Trabalhador *Hard-working*	73.61	91.14
48	O19	O Tomás participou na conversa. *Tomás participated in the conversation.*	Sociável *Sociable*	94.81	97.47
49	C6	O Rúben observou a rapariga. *Rúben observed the girl.*	Cuidadoso *Careful*	26.32	48.10
50	C7	O Guilherme agradeceu ao Fernando. *Guilherme thanked Fernando.*	Cuidadoso *Careful*	41.89	93.67
51	O20	O Tiago recusou o presente. *Tiago refused the gift.*	Frio *Cold*	61.40	72.15
52	O21	A Jéssica brindou ao sucesso. *Jéssica toasted to success.*	Alegre *Joyful*	71.62	93.67
53	D14	O Fernando ficou sozinho. *Fernando stayed alone.*	Introvertido *Introvert*	66.67	91.14

APPENDIX II – List of Adverbs used in the main task with respective inferable traits.

Adverb	Inferable Trait
Afavelmente *Affably*	Caloroso *Warm*
Afetuosamente *Affectionately*	Caloroso *Warm*
Afincadamente *Doggedly*	Trabalhador *Hard-working*
Agressivamente *Aggressively*	Violento *Violent*
Amavelmente *Kindly*	Generoso *Generous*
Animadamente *Animatedly*	Alegre *Joyful*
Apaticamente *Apathetically*	Frio *Cold*
Bondosamente *Kind-heartedly*	Generoso *Generous*
Carismaticamente *Charismatically*	Sociável *Sociable*
Cautelosamente *Cautiously*	Cuidadoso *Careful*
Cruelmente *Cruelly*	Frio *Cold*
Demoradamente *Protractedly*	Preguiçoso *Lazy*
Desgostosamente *Bitterly*	Triste *Sad*
Desinformadamente *Uninformedly*	Inculto *Uncultured*
Desmazeladamente *Slouchingly*	Preguiçoso *Lazy*
Dignamente *Decently*	Honesto *Honest*

Divertidamente *Funnily*	Alegre *Joyful*
Eficientemente *Efficiently*	Trabalhador *Hard-working*
Egocentricamente *In an egocentric way*	Egoísta *Selfish*
Envergonhadamente *Ashamedly*	Introvertido *Introvert*
Fingidamente *In a fake way*	Falso *False*
Gananciosamente *Covetously*	Egoísta *Selfish*
Honradamente *Honourably*	Honesto *Honest*
Ignorantemente *Ignorantly*	Inculto *Uncultured*
Insensivelmente *Callously*	Frio *Cold*
Integramente *Ethically*	Honesto *Honest*
Melancolicamente *Melancholically*	Triste *Sad*
Minuciosamente *Thoroughly*	Cuidadoso *Careful*
Perspicazmente *Discerningly*	Inteligente Intelligent
Sensatamente *Wisely*	Inteligente *Intelligent*
Serenamente *Serenely*	Calmo *Calm*
Tranquilamente *Quietly*	Calmo *Calm*
Zelosamente *Zealously*	Cuidadoso *Careful*

APPENDIX III – Sentences with the adverbs and the four traits to be rated in the main task, by list

LIST 1

Code	Sentences	Filler Traits			
C1	O Tiago chorou com o Rúben. *Tiago cried with Rúben.*	Triste *Sad*	Generoso *Generous*	Inteligente *Intelligent*	Falso *False*
C2	O Filipe concordou com o Cláudio. *Filipe agreed with Cláudio.*	Honesto *Honest*	Calmo *Calm*	Trabalhador *Hard-working*	Alegre *Joyful*
C3	O Frederico sorriu para o Bernardo. *Frederico smiled at Bernardo.*	Sociável *Sociable*	Alegre *Joyful*	Calmo *Calm*	Cuidadoso *Careful*
C4	O Eduardo acusou o Rodrigo. *Eduardo accused Rodrigo.*	Frio *Cold*	Falso *False*	Inculto *Uncultured*	Introvertido *Introvert*
C5	A Laura saiu de casa. *Laura left home.*	Sociável *Sociable*	Trabalhador *Hard-working*	Alegre *Joyful*	Inteligente *Intelligent*

Code	Sentences	VT	AT	Filler Traits	
O1	A Marta tropeçou cautelosamente na Carla. *Marta cautiously tripped on Carla.*	Desastrado *Clumsy*	Cuidadoso *Careful*	Introvertido *Introvert*	Sociável *Sociable*
O3	A Rebeca sossegou agressivamente a Manuela. *Rebeca aggressively calmed Manuela.*	Calmo *Calm*	Violento *Violent*	Caloroso *Warm*	Frio *Cold*
O5	O Gabriel ficou afincadamente no sofá. *Gabriel doggedly stayed in the sofa.*	Preguiçoso *Lazy*	Trabalhador *Hard-working*	Calmo *Calm*	Violento *Violent*

O7	O Mateus abraçou apaticamente o David. *Mateus apathetically hugged David.*	Caloroso *Warm*	Frio *Cold*	Sociável *Sociable*	Introvertido *Introvert*
O9	A Cecília festejou melancolicamente com a Adriana. *Rodrigo melancholically left Henrique.*	Alegre *Joyful*	Triste *Sad*	Sociável *Sociable*	Introvertido *Introvert*
D1	A Luísa cuidou zelosamente da Sara. *Luísa zealously cared for Sara.*	Generoso *Generous*	Cuidadoso *Careful*	Trabalhador *Hard-working*	Calmo *Calm*
D3	A Mariana empurrou egocentricamente a Jéssica. *Mariana pushed in an egocentric way Jéssica.*	Violento *Violent*	Egoísta *Selfish*	Falso *False*	Desastrado *Clumsy*
D5	O André divertiu carismaticamente o Tomás. *André charismatically amused Tomás.*	Alegre *Joyful*	Sociável *Sociable*	Generoso *Generous*	Inteligente *Intelligent*
D7	A Tatiana elogiou bondosamente a Catarina. *Tatiana kind-heartedly complimented Catarina.*	Caloroso *Warm*	Generoso *Generous*	Inteligente *Intelligent*	Cuidadoso *Careful*
D9	O Paulo tratou eficientemente do problema. *Paulo efficiently solved the problem.*	Inteligente *Intelligent*	Trabalhador *Hard-working*	Sociável *Sociable*	Calmo *Calm*
E1	O Ricardo ajudou honradamente o Fernando. *Ricardo honourably helped Fernando.*	Generoso *Generous*	Honesto *Honest*	Calmo *Calm*	Trabalhador *Hard-working*
E2	A Bárbara tratou desinformadamente da Patrícia. *Bárbara uninformedly cared for Patrícia.*	Cuidadoso *Careful*	Inculto *Uncultured*	Generoso *Generous*	Trabalhador *Hard-working*
E5	A Alice resolveu ignorantemente o problema. *Alice ignorantly solved the problem.*	Inteligente *Intelligent*	Inculto *Uncultured*	Trabalhador *Hard-working*	Preguiçoso *Lazy*
E6	A Isabel gozou ignorantemente com a Nicole. *Isabel ignorantly mocked Nicole.*	Falso *False*	Inculto *Uncultured*	Frio *Cold*	Introvertido *Introvert*
E9	O Miguel respondeu desinformadamente ao Lucas. *Miguel uninormedly answered Lucas.*	Sociável *Sociable*	Inculto *Uncultured*	Honesto *Honest*	Violento *Violent*

LIST 2

Code	Sentences	Filler Traits			
C6	O Rúben observou a rapariga. *Rúben observed the girl.*	Introvertido *Introvert*	Cuidadoso *Careful*	Caloroso *Warm*	Honesto *Honest*
C7	O Guilherme agradeceu ao Fernando. *Guilherme thanked Fernando.*	Sociável *Sociable*	Caloroso *Warm*	Inteligente *Intelligent*	Calmo *Calm*
C8	A Beatriz elogiou a Júlia. *Beatriz complimented Júlia.*	Generoso *Generous*	Caloroso *Warm*	Falso *False*	Inteligente *Intelligent*
C9	A Sofia aconselhou a Joana. *Sofia advised Joana.*	Generoso *Generous*	Sociável *Sociable*	Introvertido *Introvert*	Caloroso *Warm*
C10	A Manuela gozou com a Mariana. *Manuela mocked Mariana.*	Falso *False*	Frio *Cold*	Introvertido *Introvert*	Triste *Cold*

Code	Sentences	VT	AT	Filler Traits	
O2	O Artur pontapeou tranquilamente o David. *Artur quietly kicked David.*	Violento *Violent*	Calmo *Calm*	Frio *Cold*	Caloroso *Warm*
O4	O Alexandre alimentou gananciosamente o Frederico. *Alexandre covetously fed Frederico.*	Generoso *Generous*	Egoísta *Selfish*	Cuidadoso *Careful*	Desastrado *Clumsy*
O6	A Raquel continuou carismaticamente calada. *Raquel charismatically kept quiet.*	Introvertido *Introvert*	Sociável *Sociable*	Calmo *Calm*	Violento *Violent*
O8	O Rodrigo abandonou afetuosamente o Henrique. *Rodrigo affectionately left Henrique.*	Frio *Cold*	Caloroso *Warm*	Egoísta *Selfish*	Generoso *Generous*
O10	A Jéssica perdeu cautelosamente a carteira. *Jéssica cautiously lost the wallet.*	Desastrado *Clumsy*	Cuidadoso *Careful*	Triste *Sad*	Alegre *Joyful*

D2	A Carla escondeu fingidamente o sorriso. *Carla hid in a fake way the smile.*	Introvertido *Introvert*	Falso *False*	Egoísta *Selfish*	Triste *Sad*
D4	O Bruno leu afincadamente os livros. *Bruno doggedly read the books.*	Inteligente *Intelligent*	Trabalhador *Hard-working*	Sociável *Sociable*	Generoso *Generous*
D6	A Nicole estudou minuciosamente as matérias. *Nicole thoroughly studied the subjects.*	Trabalhador *Hard-working*	Cuidadoso *Careful*	Calmo *Calm*	Inteligente *Intelligent*
D8	O Bernardo roubou gananciosamente o Nicolau. *Bernardo covetously stole from Nicolau.*	Falso *False*	Egoísta *Selfish*	Frio *Cold*	Triste *Sad*
D10	A Carolina cumprimentou afavelmente a Eduarda. *Carolina affably greeted Eduarda.*	Sociável *Sociable*	Caloroso *Warm*	Calmo *Calm*	Cuidadoso *Careful*
E3	O Samuel salvou dignamente o Gustavo. *Samuel decently saved Gustavo.*	Generoso *Generous*	Honesto *Honest*	Cuidadoso *Careful*	Alegre *Joyful*
E4	A Paula mentiu honradamente à Sofia. *Paula honourably lied to Sofia.*	Falso *False*	Honesto *Honest*	Egoísta *Selfish*	Generoso *Generous*
E7	O José sorriu integramente para o Miguel. *José ethically smiled at Miguel.*	Sociável *Sociable*	Honesto *Honest*	Alegre *Joyful*	Cuidadoso *Careful*
E8	A Adriana enganou dignamente a Débora. *Adriana decently fooled Débora.*	Falso *False*	Honesto *Honest*	Frio *Cold*	Caloroso *Warm*
E10	O Luís concordou honradamente com o Vítor. *Luís honourably agreed with Vítor.*	Honesto *Honest*	Falso *False*	Sociável *Sociable*	Introvertido *Introvert*

LIST 3

Code	Sentences	Filler Traits			
C1	O Tiago chorou com o Rúben. *Tiago cried with Rúben.*	Triste *Sad*	Generoso *Generous*	Inteligente *Intelligent*	Falso *False*
C3	O Frederico sorriu para o Bernardo. *Frederico smiled at Bernardo.*	Sociável *Sociable*	Alegre *Joyful*	Calmo *Calm*	Cuidadoso *Careful*
C5	A Laura saiu de casa. *Laura left home.*	Sociável *Sociable*	Trabalhador *Hard-working*	Alegre *Joyful*	Inteligente *Intelligent*
C7	O Guilherme agradeceu ao Fernando. *Guilherme thanked Fernando.*	Sociável *Sociable*	Caloroso *Warm*	Inteligente *Intelligent*	Calmo *Calm*
C9	A Sofia aconselhou a Joana. *Sofia advised Joana.*	Generoso *Generous*	Sociável *Sociable*	Introvertido *Introvert*	Caloroso *Warm*

Code	Sentences	VT	AT	Filler Traits	
O11	A Júlia ameaçou serenamente a Cecília. *Júlia serenely threatened Cecília.*	Violento *Violent*	Calmo *Calm*	Frio *Cold*	Caloroso *Warm*
O13	O David desistiu divertidamente da vida. *David funnily gave up on life.*	Triste *Sad*	Alegre *Joyful*	Introvertido *Introvert*	Sociável *Sociable*
O15	O Henrique gritou serenamente com o Rodrigo. *Henrique serenely yelled at Rodrigo.*	Violento *Violent*	Calmo *Calm*	Egoísta *Selfish*	Generoso *Generous*
O17	O Fernando amavelmente escondeu o bolo. *Fernando kindly hid the cake.*	Egoísta *Selfish*	Generoso *Generous*	Frio *Cold*	Caloroso *Warm*
O19	O Tomás envergonhadamente participou na conversa. *Tomás ashamedly participated in the conversation.*	Sociável *Sociable*	Introvertido *Introvert*	Alegre *Joyful*	Triste *Sad*

D11	A Maria brincou animadamente com a Beatriz. *Maria animatedly played with Beatriz.*	Sociável *Sociable*	Alegre *Joyful*	Generoso *Generous*	Cuidadoso *Careful*
D13	A Eduarda conversou tranquilamente com a Bárbara. *Eduarda quietly talked with Bárbara.*	Sociável *Sociable*	Calmo *Calm*	Alegre *Joyful*	Generoso *Generous*
D15	O Vítor acusou insensivelmente o Gabriel. *Vítor callously accused Gabriel.*	Falso *False*	Frio *Cold*	Inculto *Uncultured*	Introvertido *Introvert*
D17	O Cláudio arrumou desmazeladamente o quarto. *Cláudio slouchingly cleaned the room.*	Trabalhador *Hard-working*	Preguiçoso *Lazy*	Cuidadoso *Careful*	Desastrado *Clumsy*
D19	O Nicolau abandonou cruelmente o Alexandre. *Nicolau cruelly left Alexandre.*	Egoísta *Selfish*	Frio *Cold*	Introvertido *Introvert*	Triste *Sad*
E1	O Ricardo ajudou honradamente o Fernando. *Ricardo honourably helped Fernando.*	Generoso *Generous*	Honesto *Honest*	Calmo *Calm*	Trabalhador *Hard-working*
E3	O Samuel salvou dignamente o Gustavo. *Samuel decently saved Gustavo.*	Generoso *Generous*	Honesto *Honest*	Cuidadoso *Careful*	Alegre *Joyful*
E5	A Alice resolveu ignorantemente o problema. *Alice ignorantly solved the problem.*	Inteligente *Intelligent*	Inculto *Uncultured*	Trabalhador *Hard-working*	Preguiçoso *Lazy*
E7	O José sorriu integramente para o Miguel. *José ethically smiled at Miguel.*	Sociável *Sociable*	Honesto *Honest*	Alegre *Joyful*	Cuidadoso *Careful*
E9	O Miguel respondeu desinformadamente ao Lucas. *Miguel uninormedly answered Lucas.*	Sociável *Sociable*	Inculto *Uncultured*	Honesto *Honest*	Violento *Violent*

LIST 4

Code	Sentences	Filler Traits			
C2	O Filipe concordou com o Cláudio. *Filipe agreed with Cláudio.*	Honesto *Honest*	Calmo *Calm*	Trabalhador *Hard-working*	Alegre *Joyful*
C4	O Eduardo acusou o Rodrigo. *Eduardo accused Rodrigo.*	Frio *Cold*	Falso *False*	Inculto *Uncultured*	Introvertido *Introvert*
C6	O Rúben observou a rapariga. *Rúben observed the girl.*	Introvertido *Introvert*	Cuidadoso *Careful*	Caloroso *Warm*	Honesto *Honest*
C8	A Beatriz elogiou a Júlia. *Beatriz complimented Júlia.*	Generoso *Generous*	Caloroso *Warm*	Falso *False*	Inteligente *Intelligent*
C10	A Manuela gozou com a Mariana. *Manuela mocked Mariana.*	Falso *False*	Frio *Cold*	Introvertido *Introvert*	Triste *Cold*

Code	Sentences	VT	AT	Filler Traits	
O12	O Rafael convidou envergonhadamente o Nicolau. *Rafael ashamedly invited Nicolau.*	Sociável *Sociable*	Introvertido *Introvert*	Generoso *Generous*	Egoísta *Selfish*
O14	O Lucas caiu zelosamente no buraco. *Lucas zealously fell into the hole.*	Desastrado *Clumsy*	Cuidadoso *Careful*	Triste *Sad*	Alegre *Joyful*
O16	A Sara ofereceu egocentricamente presentes. *Sara offered in an egocentric way gifts.*	Generoso *Generous*	Egoísta *Selfish*	Caloroso *Warm*	Frio *Cold*
O18	A Juliana analisou desmazeladamente o documento. *Juliana slouchingly analyzed the document.*	Trabalhador *Hard-working*	Preguiçoso *Lazy*	Cuidadoso *Careful*	Desastrado *Clumsy*
O21	A Jéssica brindou melancolicamente ao sucesso. *Jéssica melancholically toasted to success.*	Alegre *Joyful*	Triste *Sad*	Sociável *Sociable*	Introvertido *Introvert*

D12	O Gustavo venceu perspicazmente a corrida. *Gustavo discerningly won the race.*	Trabalhador *Hard-working*	Inteligente *Intelligent*	Sociável *Sociable*	Alegre *Joyful*
D14	O Fernando ficou desgostosamente sozinho. *Fernando bitterly stayed alone.*	Introvertido *Introvert*	Triste *Sad*	Egoísta *Selfish*	Falso *False*
D16	A Tatiana aconselhou sensatamente a Cecília. *Tatiana wisely advised Cecília.*	Generoso *Generous*	Inteligente *Intelligent*	Caloroso *Warm*	Cuidadoso *Careful*
D18	A Joana acabou demoradamente a tarefa. *Joana protractedly completed the task.*	Trabalhador *Hard-working*	Preguiçoso *Lazy*	Cuidadoso *Careful*	Desastrado *Clumsy*
D20	A Catarina festejou divertidamente com a Carolina. *Catarina funnily celebrated with Carolina.*	Sociável *Sociable*	Alegre *Joyful*	Calmo *Calm*	Generoso *Generous*
E2	A Bárbara tratou desinformadamente da Patrícia. *Bárbara uninformedly cared for Patrícia.*	Cuidadoso *Careful*	Inculto *Uncultured*	Generoso *Generous*	Trabalhador *Hard-working*
E4	A Paula mentiu honradamente à Sofia. *Paula honourably lied to Sofia.*	Falso *False*	Honesto *Honest*	Egoísta *Selfish*	Generoso *Generous*
E6	A Isabel gozou ignorantemente com a Nicole. *Isabel ignorantly mocked Nicole.*	Falso *False*	Inculto *Uncultured*	Frio *Cold*	Introvertido *Introvert*
E8	A Adriana enganou dignamente a Débora. *Adriana decently fooled Débora.*	Falso *False*	Honesto *Honest*	Frio *Cold*	Caloroso *Warm*
E10	O Luís concordou honradamente com o Vítor. *Luís honourably agreed with Vítor.*	Falso *False*	Honesto *Honest*	Sociável *Sociable*	Introvertido *Introvert*

APPENDIX IV – Mean Rating for VT and AT, and mean acceptability rating for each sentence ordered from less semantically acceptable to more.

Sentence Code	Main Task Rating		Post-Test Rating
	VT	AT	
O10	4.067	3.867	1.74
E4	3.500	3.900	1.78
O15	3.133	5.333	1.82
E8	3.033	4.633	1.84
O14	4.600	3.600	2.1
O16	4.133	4.333	2.44
O13	3.867	3.467	2.46
O1	4.250	4.563	2.54
O2	4.133	4.800	2.54
O4	3.867	3.400	2.74
O8	3.600	3.533	2.74
O3	3.188	3.438	2.76
O6	3.200	4.733	3.08
E5	3.579	3.619	3.16
E2	4.213	2.838	3.34
D3	3.563	4.313	3.42
E7	5.133	4.667	3.58
E6	3.483	2.985	3.74
O5	4.438	3.375	3.76
E10	2.667	4.700	3.96
E9	4.481	3.254	3.98
O9	4.375	2.938	4.02
O21	2.867	4.667	4.08

O11	3.467	4.067	4.10
O17	3.067	4.133	4.26
D2	4.400	5.467	4.38
D5	4.875	4.813	4.48
D17	3.267	4.067	4.62
O18	4.533	3.267	4.80
D8	3.000	3.467	4.92
D18	4.667	3.200	5.14
O7	4.500	3.125	5.16
E1	4.738	4.773	5.26
E3	4.167	4.433	5.3
O12	5.133	3.667	5.42
D14	4.200	3.533	5.48
D12	4.267	3.733	5.60
D15	3.333	3.800	5.64
D7	4.125	4.500	5.66
O19	3.933	3.867	5.70
D19	3.667	3.667	5.74
D1	5.438	5.188	5.80
D4	5.000	5.533	5.82
D20	4,667	4.467	6.10
D10	5.000	4.867	6.12
D11	5.600	5.133	6.16
D16	4.667	4.533	6.16
D6	5.667	4.800	6.18
D9	4.188	4.688	6.28
D13	5.133	5.133	6.60

APPENDIX V – Sentence-by-sentence analysis using syntactic and semantic factors and characteristics for Conditions Opposite, Different and Empty

Sentence Code	Aspectual Class	Verb Government	Polarity		Adverb Interpretation		Thematic Roles	
			Verb Polarity	Adverb Polarity	Subject-Oriented	Manner	Subject	Complements / Modifiers
O1	Semelfactive	Oblique Obj.	-	+	✓	✓	Proto-Patient	Cause
O2	Accomplishment	Direct. Obj.	-	+		✓	Agent	Proto-Patient
O3	Activity	Direct. Obj.	+	-		✓	Agent	Proto-Patient
O4	Accomplishment	Direct. Obj.	+	-	✓	✓	Agent	Proto-Patient
O5	State	Oblique Obj.	-	+		✓	Proto-Patient	-
O6	State	Subject. P.	-	+	✓	✓	Proto-Patient	-
O7	Accomplishment	Direct. Obj.	+	-		✓	Agent	Proto-Patient
O8	Achievement	Direct. Obj.	-	+	✓	✓	Agent	Proto-Patient

O9	Activity	Oblique Obj.	+	-		✓	Agent	Company
O10	Achievement	Direct. Obj.	-	+	✓	✓	Proto-Patient	Proto-Patient
O11	Accomplishment	Direct. Obj.	-	+	✓	✓	Agent	Proto-Patient
O12	Achievement	Direct. Obj.	+	-		✓	Agent	Proto-Patient
O13	State	Oblique Obj.	-	+		✓	Agent	Proto-Patient
O14	Semelfactive	Modifier	-	+		✓	Proto-Patient	Location
O15	Activity	Oblique Obj.	-	+	✓	✓	Agent	Proto-Patient
O16	Accomplishment	Direct. Obj.	+	-	✓	✓	Agent	Proto-Patient
O17	Achievement	Direct. Obj.	-	+	✓	✓	Agent	Proto-Patient
O18	Accomplishment	Direct. Obj.	+	-	✓	✓	Agent	Proto-Patient
O19	Activity	Oblique Obj.	+	-	✓	✓	Agent	Proto-Patient
O21	Semelfactive	Modifier	+	-	✓	✓	Agent	Proto-Patient

D1	Accomplishment	Oblique Obj.	+	+	✓	✓	Agent	Proto-Patient
D2	Activity	Direct. Obj.	-	-	✓	✓	Agent	Proto-Patient
D3	Achievement	Direct. Obj.	-	-	✓	✓	Agent	Proto-Patient
D4	Accomplishment	Direct. Obj.	+	+		✓	Agent	Proto-Patient
D5	Accomplishment	Direct. Obj.	+	+	✓	✓	Agent	Proto-Patient
D6	Accomplishment	Direct. Obj.	+	+		✓	Agent	Proto-Patient
D7	Accomplishment	Direct. Obj.	+	+	✓	✓	Agent	Proto-Patient
D8	Achievement	Direct. Obj.	-	-	✓	✓	Agent	Proto-Patient
D9	Achievement	Oblique Obj.	+	+	✓	✓	Agent	Proto-Patient
D10	Achievement	Direct. Obj.	+	+	✓	✓	Agent	Proto-Patient
D11	Activity	Oblique Obj.	+	+		✓	Agent	Company
D12	Achievement	Direct. Obj.	+	+	✓	✓	Agent	Proto-Patient

D13	Activity	Oblique Obj.	+	+	✓	✓	Agent	Company
D14	State	Subject. P.	-	-		✓	Proto-Patient	-
D15	Achievement	Direct. Obj.	-	-	✓	✓	Agent	Proto-Patient
D16	Accomplishment	Direct. Obj.	+	+	✓	✓	Agent	Proto-Patient
D17	Accomplishment	Direct. Obj.	+	-	✓	✓	Agent	Proto-Patient
D18	Achievement	Direct. Obj.	+	-		✓	Agent	Proto-Patient
D19	Achievement	Direct. Obj.	-	-	✓	✓	Agent	Proto-Patient
D20	Activity	Modifier	+	+		✓	Agent	Company
E1	Accomplishment	Direct. Obj.	+	+	✓	✓	Agent	Proto-Patient
E2	Accomplishment	Oblique Obj.	+	-		✓	Agent	Proto-Patient
E3	Achievement	Direct. Obj.	+	+	✓	✓	Agent	Proto-Patient
E4	Activity	Indirect Obj.	-	+	✓	✓	Agent	Proto-Patient

E5	Achievement	Direct. Obj.	+	-	✓	✓	Agent	Proto-Patient
E6	Activity	Oblique Obj.	-	-	✓	✓	Agent	Proto-Patient
E7	Activity	Oblique Obj.	+	+	✓	✓	Agent	Recipient
E8	Accomplishment	Direct. Obj.	-	+	✓	✓	Agent	Proto-Patient
E9	Activity	Indirect Obj.	+	-		✓	Agent	Recipient
E10	Achievement	Oblique Obj.	+	+	✓	✓	Agent	Company